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Review

Mining enterprise and partnerships for socio-economic development

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Partnerships are emerging as important for the business operations of mining enterprises in many parts of the world, particularly in the global South. During 2010, the London-based International Council on Mining and Minerals launched a global initiative which is geared to strengthen the contribution of mining to development goals and poverty reduction by promoting multi-stakeholder partnerships. The purpose of this article is to furnish a critical review of relevant international experience of partnerships between mining companies and governments. These partnerships are considered to represent innovative cooperation models for economic development (especially diversification) and service delivery. It is argued that whilst partnerships represent an aspect of good business practice for mining enterprises, partnerships are not a panacea and in certain situations may not be an appropriate model for delivering results. In light of the significance of socio-economic development in sub-Saharan Africa, and of the potential for expansion of mining activities, further research is required concerning the operations of mining enterprises and partnerships in this region of the global economy.

Key words: Mining, business practice, partnerships, socio-economic development, sub-Saharan Africa.

INTRODUCTION

The activities of mining enterprises remain of central importance to socio-economic development in several parts of the world, not least in many countries of sub-Saharan Africa. Recently, among leading international mining corporations there is a new commitment towards the establishment of partnerships for development (ICMM, 2010a). Initially the partnership concept was recognized during the 1980s "as a promising way of helping local communities cope with problems specific to their area" (OECD, 2001). In response to growing local economic pressures, the public sector, private sector and community-based organizations sought out new means to promote local economic and employment development (World Bank, 2001). Partnerships are defined as collaborations which are formed between the private sector, local governments and/or civil society with a commitment to work together on a project or programme in order to pursue common goals and in which the different partners bring complementary resources, contribute to the design of the programme and share risks and benefits (Stibbe, 2008). The growth of partnerships around mining enterprises is evidenced in the 'Partnerships for Development', a global initiative which aims to

strengthen mining's contribution to development goals and poverty reduction through the promotion of multi-stakeholder partnerships (ICMM, 2010b). Significantly, this global initiative is led by the London-based organization the International Council on Mining and Minerals (ICMM), which involves 19 member companies. This important global initiative for promoting partnerships around mining businesses was launched in February, 2010, at the Indaba mining convention which was held in Cape Town, South Africa.

The objective in this paper is to offer a critical review of relevant international experience of partnering or more specifically of the emergence of partnerships between mining companies and governments. These partnerships are considered to represent innovative cooperation models for economic development (especially diversification) and service delivery. Methodologically, the article represents a critical analysis of a range of academic investigations particularly concerning mining business activities in Australia, Canada and sub-Saharan Africa. In particular, this investigation interrogates the recent outputs of research programmes which have been undertaken by the Business Partners for Development Natural

Resources Cluster, the Oil, Gas, Mining and Chemicals Department of the World Bank, and the International Council on Mining and Minerals.

MAXIMISING THE SOCIO-ECONOMIC IMPACTS OF MINING

Considerable controversy surrounds the impacts of mining in developing countries both at national level and for the host communities. On the one hand, there is a school of thought which is pro-mining and stresses variously the positive impacts of mining for downstream local industry, cluster formation, for job creation, for technological advancement, innovation and substantial revenue flows (World Bank, 2002a; Buitelaar, 2001). Mainly, this school of thought bases its arguments that even though the abundance of natural resources is exogenous, natural wealth itself is not and rather depends on other factors, most importantly, the quality of institutions. In Ghana for example, advocates of mining contend that the industry is a star performer and contributes substantially to national development and poverty reduction, pointing to increased FDI flows into the sector, rising mineral output and exports and increased mineral exploration (Akabzaa, 2009).

On the other hand, a second school of writers stress the negative consequences of mining-led development (World Bank, 2002a). Among the most prominent issues are *inter alia*, disadvantages associated with specialization and dangers of vulnerability; the warping of investment policies such that governments end up investing in projects that not only generate low returns but involve large recurrent costs; and, that revenues from mining can finance and fuel internal conflicts within a country. Especially in countries such as the DR Congo with fragile institutions, the mining sector is considered to have generated more misery than wealth for local populations (Mazalto, 2009). Local communities are often compelled to bear the negative social and environmental effects of mining but do not receive much of the revenues from extractive activities (Campbell, 2009a).

Several critical observers draw attention to the 'resource curse' or paradox whereby countries with large endowments of natural resources often suffer from low growth rates, high economic volatility, corruption and sometimes devastating civil conflicts (World Bank, 2002a; Girones et al., 2009). In Africa, much criticism is directed at the fact that mining companies are often granted too many tax subsidies and concessions and that there is a high incidence of tax avoidance by mining companies (Akabzaa, 2009; Campbell, 2009a, b, c). Taken together with inadequate institutional capacity to ensure tax compliance, the result is "to diminish the contribution of mineral resource rents to national development" (Open Society Institute of Southern Africa, 2009). In Ghana, mining skeptics point to the fact that over-bloated tax

concessions and incentives to mining investors leave little in the way of retained earnings for visible national development efforts (Akabzaa, 2009).

There is increased consensus that investment in mining and mineral resources does not always guarantee positive social and economic outcomes (ICMM, 2010b). One recent analysis, conducted of 33 mineral dependent countries, showed that while around half of these countries had been "broadly successful" as regards socio-economic development, as judged against a basket of indicators, the other half had performed poorly. Many of these poor performers were exhibiting symptoms of what is sometimes styled as the 'resource curse' (ICMM, 2010b). The resource curse argument is basically that notwithstanding the short-term gains from mining, the long-term consequences may be low or adverse for many countries. This is so because the presence of mining can create incentives for the private sector or governments "that are inimical to the creation of both the appropriate economic institutions and the impulses to modernization that are normally associated with sustainable development" (ICMM, 2006).

From a cross-country investigation of the best and worst performers related to mining and development, the important conclusion emerges that "it is the quality of economic management at large, as well as the competency and independence of institutions that determines whether a country's mining sector can support and enhance economic growth or is instead likely to fuel deterioration" (World Bank, 2002a). Put differently, the contribution of mining to a country's economy "does not take place in isolation, but rather in the overall context of the country's economic management and institutions. It is thus the quality and competency of these policies and institutions that will determine whether a mining sector can promote economic growth or whether revenues generated by the sector might impede development" (World Bank, 2002a).

In an important recent contribution to debates around mining in Africa, the work of Campbell (2009a, b) and her colleagues challenges the emphasis which the World Bank and other international agencies often given to 'internal factors', such as corruption, lack of transparency and 'weak governance', in explaining the disappointing performance of mining for local economies in Africa. Although the importance of these issues must not be downplayed, it is essential that other considerations be taken into account. Campbell (2009a) stresses that an emphasis on issues of corruption or lack of transparency runs the danger of masking the fact that such situations are often facilitated and even perpetuated by relations that are characterized by a lack of transparency which have been initiated by powerful external actors as well as by relations that mining enterprises may establish with certain local decision-makers. The essential argument is thus one of treating the symptoms of a particular politics of mining rather than the relations of influence and the

structural conditions that make such dysfunctional processes possible (Campbell, 2009a).

The experience of mineral-led development in countries like Ghana, Guinea, Mali, Madagascar or DR Congo suggests that they lack any cogent programmes for the utilization and integrated development of mineral resources (Belem, 2009; Campbell, 2009c; Mazalto, 2009; Sarrasin, 2009). This lack of institutional framework cannot be attributed simply to internal factors but is considered from a political economy framework to be the outcome of the implementation of a set of mining reforms at the behest of international finance institutions and designed to encourage in the context of global competitive markets 'attractive investment environments' for mining investors (Campbell, 2009a, b). It is argued that a critical factor is the 'paradigm shift' that occurred to the viewpoint that the state should be constrained to the promotion and (weak) regulation of private investment and not be directly involved in the management of mining projects (Akabzaa, 2009).

Although the evidence from some developing countries suggests that mineral development can enhance economic growth and sustain per capita income growth over extended periods of time, less clear is the argument as to whether mining contributes to poverty reduction (ICMM, 2006). It is contended that extractive industries can bring positive development impacts both to countries and affected communities but also have the potential to create or exacerbate vulnerabilities within communities, not least a differential impact upon men and women (Eftimie et al., 2009a, b). Recent World Bank research points to gender biases and risks in mining projects; often with a situation that benefits accrue to men in the form of employment or procurement opportunities whereas the costs of mining projects "such as family and social disruption, and environmental degradation, fall most heavily on women" (Eftimie et al., 2009a). Overall, the World Bank analysis points to the fact that as sustained economic growth is a prerequisite for poverty reduction, mining could be expected to reduce poverty profiles as a whole. Nevertheless, there are several other ways in which mining can assist in poverty reduction which are discernible

- i. By the creation of income generating opportunities for the poor directly in mining;
- ii. By promoting growth in lateral or downstream businesses;
- iii. By acting as a catalyst for infrastructure improvements which are a basis for expanded economic activity and livelihoods of the poor (World Bank, 2002a).

From a political economy perspective, Campbell (2009a, b) and others show that poverty reduction will require the enactment of measures for pro-poor governance, social and environmental protection, and respect for human rights. In one critical investigation of Ghana, these conditions have been found wanting and it was concluded

that the generous incentives greatly limited the share of government revenues from mining and corresponding opportunities for government to fund social and development programmes. Indeed, this study showed that mining had not fulfilled its poverty reduction role and that poverty reduction was not mainstreamed into mining policies (Akabzaa, 2009). Considerable importance was attached to the nature of existing mining codes which were silent on measures that might be required to effectively deliver benefits to local communities impacted by mining, to protect the physical environment and protect the rights of vulnerable segments of the population (Akabzaa, 2009).

The detailed evidence from another investigation of four countries – Chile, Ghana, Peru and Tanzania – on the local impacts of mining and poverty reduction confirm mixed findings on the links between mining and poverty indicators. Uneven performance was recorded in terms of the status of local development and diversification with significant levels of local procurement and supplier upgrading recorded in Chile, but limited procurement locally in other cases (ICMM, 2006). The ICMM (2006) concluded that with regard to economic diversification and the long-term sustainability of communities after mine closure "the picture is somewhat discouraging, except in the case of Chile". Outside of Chile, the cross-country studies reveal limited evidence of planning by mining firms in partnership with other stakeholders to consider issues related to a post-mining economy (ICMM, 2006). In Tanzania, for example, it was found "arrangements necessary to support local economic development and economic diversification including the long term sustainability of mining communities when mines close – remain incomplete" (ICCM, 2007: 12). Even for Chile, however, the picture is not conclusive. Aroca (2001) looking at Chilean II region points to the fact that the mining sector "is not important in terms of the backward and forward linkages in the region" and that the mining sector operated largely independent of the rest of the regional economy (Aroca, 2001).

An important observation is that the lack of diversification in most developing world countries "may be a reflection of a lack of guidelines and available techniques to assess whether mining communities are viable after local mines shut, and how the closure process should be managed" (ICMM, 2006). One recent World Bank (2009) investigation argues fundamentally that in "the absence of adequate planning and mitigation measures" the impacts of resource extraction in local communities can have persistent and adverse effects. In particular, it is stressed that the closure phase of a mine must be understood as a sustainable development issue (World Bank, 2009). The general conclusion from the international experience is that planning for the socio-economic impact of mining should commence at the time that the mine opens (Kuyek and Coumans, 2003). Further, the integration of mining projects into wider regional development planning "can be an effective way to reduce the

the dependency of a region on the mine and can set a better framework for delivery of social services such as health and education" (World Bank, 2009). The case of Canada is instructive for a country which has an extended record of dealing with the revitalization of mining dependent communities and recently has adopted the approach that mining companies operating in remote areas should not build company towns any longer. Instead, the emphasis is upon encouraging long distance commuting by workers either by car or on fly-in – fly-out arrangements to stay in only in temporary camps rather than in established mining settlements (Kuyek and Coumans, 2003).

Notwithstanding the somewhat special Canadian case, the ICMM (2006) asserts that closure issues ideally should be considered with local and regional governments from the mine planning stage and updated regularly thereafter. In a recent ICMM publication, it was asserted that there is a need "to consider closure as a core part of our business" and that the "integration of closure considerations into an operation's planning and engineering processes is an important mechanism for a mine to create lasting value" (ICMM, 2011a). A similar position is offered from the World Bank's international review on mine closures. It was considered that in order to be fully effective the process of planning for mine closure should commence at the mine design stage (World Bank, 2002b). The significance of well planned mine closure is that it represents a bridge to "transfer capital extracted from mining to generations to come, thus achieving benefits for today's mining communities and countries that will be sustainable in the future" (World Bank, 2002b).

In addition to limited long-term closure planning, the ICMM (2008b; 2010c) is critical of the disappointing record related to local and regional economic development. In Peru the evidence pointed to a conclusion that regional development plans appear to be largely absent or dated". In addition, there was an uneven engagement of mining companies in enhancing local content to grow local economies (ICMM, 2008b). Overall, the four country case studies "reveal much investment in interesting individual projects but little evidence of consistent planning by mining firms and other stakeholders (including local and national government) to consider a future for local economies after mining" (ICMM, 2006).

Nevertheless, it is generally accepted that the resource curse is not inevitable and that large-scale mining projects can provide an important and sometimes critical boost for economic growth in developing countries as well as help them reduce poverty and engage in the international economy (World Bank, 2002a; ICMM, 2006, 2008b). As Buitelaar (no date) argues in respect of Latin America, "there is nothing intrinsic in mining that hinders it to be an engine of economic and social development in the region". A search for ways to enhance or maximize the social and economic contribution of mining, however,

is critical (ICMM, 2010b, 2010c).

One pivotal finding from a range of international studies is that "the most important determinant of whether mining will contribute to economic growth and poverty reduction is the overall governance framework" (ICMM 2010b). 'Policy reform' for the development of mining operations is thus an essential step (World Bank, 2003).

Once again, a simplistic view of this as internal issue is challenged from the political economy perspective used by Campbell (2009b) which stresses that current attention devoted to 'capacity building for resource governance' in developing countries sidesteps the critical point that past policy reform measures in Africa which sought to open up the extractive sectors for investment, have done so in ways that have severely weakened the political and institutional capacity of national governments. It is stressed that there is frequently a lack of capacity to enforce regulations, and that to limit reforms, the questions of 'better norms and standards' is not sufficient as a means to ensure that the mining sector serves as a lever of development, especially in sub-Saharan Africa. What is required, it is argued, is "the need to introduce more appropriate legal, fiscal and regulatory frameworks for mining and to do this from a developmental perspective" (Campbell, 2009b). Three core areas for improvement relate to pro-poor public and corporate governance, including proactive planning to maximize poverty alleviation through sustainable development; more effective social and environmental policies; and respect for human rights.

It would be cautioned therefore that "enhancing the positive social and economic contribution from mining is not always easy: it depends on sound governance on the part of public sector agencies and, in regions where governance is weak, on proactive collaboration between companies and other stakeholders to help build adequate capacity to generate benefits at community and national levels" (ICMM, 2010c).

One critical finding from cross-country international research is that "more collaborative action and stronger partnerships between mining companies, government, civil society organizations and donors are needed to unlock the full potential of mineral wealth" (ICMM, 2008a).

As a whole, the development of, "more partnerships between companies and other stakeholders, can be the most effective way to strengthen mining's social and economic contribution (ICMM, 2010c)".

The ICMM has set down a set of 10 sustainable development principles for its members. Of these principles, five are of special relevance to mining partnerships:

- i. **Principle 1:** Implement and maintain ethical business practices and sound systems of corporate governance.
- ii. **Principle 2:** Integrate sustainable development considerations within corporate decision-making.
- iii. **Principle 3:** Uphold fundamental human rights and respect for cultures, customs and values in dealing with

employees and others affected by mining activities.

iv. **Principle 9:** Contribute to the social, economic and institutional development of communities.

v. **Principle 10:** Implement effective and transparent engagement, communication and independently verified reporting arrangements with stakeholders (ICMM 2010a: 3).

PARTNERSHIPS FOR DEVELOPMENT IN MINING

It is made clear that the achievement of positive outcomes linked to mining projects is often, if not always, beyond the control of mining companies themselves. For example, in Tanzania it was concluded that “mining companies can only do so much on their own to address the inherent social tensions and economic rifts that a major new investment may create” (ICMM, 2007). Accordingly, it is contended that partnerships between companies, (local and national) governments, development agencies and civil society “can help fill capacity and governance gaps where necessary and help to expand, broaden and deepen the overall socio-economic contribution from mining” (ICMM, 2010b). It is stressed also that such “partnerships can drive progress on issues that companies acting alone may not have the capacity or mandate to address” (ICMM, 2010b). Accordingly, the ICMM asserts that mining companies can contribute towards addressing governance gaps through getting involved in multi-stakeholder partnerships of various kinds (ICMM, 2010c). The ICMM seeks to encourage stakeholders to join together across a number of different issues which affect mining’s contribution towards socio-economic development (ICMM 2010b, c, 2011b).

The ‘partnership’ model in the mining sector has its origins in the work of the Business Partners for Development Natural Resources Cluster which produced a series of working papers on the need for “tri-sector” partnerships between corporations, government and civil society (Warner 2000; Davy, 2000, 2001a, b; Warhurst, 2000; Warner, 2002). Tri-sector partnerships were considered to offer a ‘new model’ for converting the wealth generated by the private sector in developing countries into sustainable local development” (Warner, 2000). Within the mining sector, it was stated that the tri-sector partnership for ‘smarter’ social investment represented a “new type of product – a unique set of relationships that if properly maintained can increase rates of investment return, create social capital, and produce a continuous set of benefits” (Warner, 2000). Tri-sector partnerships could link to a number of issues including improved revenue management or strengthening “the capacity of municipal authorities to deliver improved public services in line with growing local expectations” (Warner, 2000: 4). Importantly, it was recognized also that the nature of partnerships would vary across different operational phases of a mining project from exploration to de-commissioning. The

World Bank (2002b) considers that mine closure processes represents “a prime example of how the new model of trilateral dialogue and cooperation that has been emerging in the mining industry can reduce costs and enhance results for all parties involved”.

Another key finding has been that whereas independent social investment activity by a mining enterprise might help to gain a ‘social license’ to operate, working through a partnership offered a better prospect for long-term sustainability (Davy, 2000). Furthermore, with the building of understanding and trust, partnerships have the potential to create a wider distribution – geographical and social – of the benefits of mining (Davy, 2000). A further advantage of partnerships is their potential to leverage additional resources that cover a wider spatial area than the mine project ‘footprint’. Partnerships could also result in better management of community expectations linked to and triggered by mining projects (Davy, 2001a). Monitoring of partnerships and their progress was considered a vital aspect of such arrangements (Warner, 2002).

Six priority themes are identified by the ICMM (2006, 2010b) in respect of contemporary mining and partnerships. Key elements of these six different priority themes are examined further.

Mining and poverty reduction

The ICMM (2010c) defines poverty reduction as activities that seek to promote growth and reduce the level of poverty in a community, a group of people or country, through economic and social policies and programmes where possible in line with the Millennium Development goals. It is stressed that this might encompass “strategies to create jobs and micro-enterprises and increase access to basic goods and services for economically marginalized groups” (ICMM, 2010c). As in much of the developing world, mining occurs in remote areas, where subsistence agriculture may be the only alternative form of livelihood opportunity, partnerships for agricultural development are important as also are investments in areas such as health, education or basic service provision.

In respect of addressing poverty reduction, four main opportunities are identified. First, to explore mining industry input into the development of poverty reduction strategy papers (PRSP). The World Bank’s ‘Poverty reduction strategies source book’ for governments contains specific guidance on mining. Nevertheless, there are very few examples either of governments actively consulting the mining industry in the development of a PRSP, or the mining industry proactively offering its input. Second is to learn from artisanal and small scale mining (ASM) engagement. ASM plays a pivotal role in alleviating poverty in many rural regions of the developing world. A set of guidelines to assist large-scale mines in their relationships with small-scale mine operations is

available and stresses the need for a mutually beneficial engagement between mining companies and ASM operators. A third opportunity for poverty reduction is to learn engagement with 'indigenous people' such as Aborigines in Australia or native Indians in Latin America (Altman, 2009a, b). The fourth critical issue relates to poverty reduction, which relates to ameliorating the negative environmental consequences of mining operations (Belem, 2009). In many African countries, surface mining results in the alienation of large tracts of land from communities which deprives poor and marginalized communities of their land surface rights and as a result, deprives communities of their sources of livelihood. Often, this is accompanied by social upheavals and population relocations (Akabzaa, 2009).

In summary, large mining companies can make a major contribution to reducing poverty among some of the most economically marginalized communities in the world. For mining companies, the central challenges are to understand poverty in their area of operations, to participate in development dialogues and to support local capacity building in projects and programmes that assist towards poverty reduction. For governments the challenges of such partnerships are to integrate mining into broader poverty alleviation strategies and to acknowledge mining's potential contribution to poverty reduction. Further, there is the obligation on national governments to seek to promote governance that is in the interests of the poor with regard to mining activities as a whole (Belem, 2009; Campbell, 2009b). In respect of the critical challenges around the environment, the key is to ensure a framework of mining legislation which ensures protection of the environment (Campbell, 2009a).

Mining and economic development – revenue management

The ICMM (2010c) defines revenue management as steps that companies can proactively take to ensure effective use of mining revenues, particularly at a sub-national level. This may involve support for government capacity building and technical assistance projects, or revenue transparency projects. It is argued from experience in Ghana that ultimately, the ability of the minerals sector to contribute to achievement of poverty reduction targets at community level depends on the amount of mineral resource benefits that are retained locally and their prudent management and allocation (Akabzaa, 2009).

With the advance of decentralization in many developing countries, the question of revenue management associated with mining projects becomes of increasing significance. Moreover, it is acknowledged that "without investing in capacity building at local and regional levels, the decentralization process is likely to be ineffective" (ICMM, 2010c). A further factor that moves revenue

management up the policy agenda is increasing public debate in many developing countries about revenue transparency and the growing public debates about the management of mining-generated revenues. The promotion of transparency in revenue flows is considered one of the most critical dimensions of pro-poor governance in mining (Campbell, 2009a).

The most promising initiative in revenue management relates to what is styled the extractive industries transparency initiative or EITI. The EITI process, as used for example in Ghana, involves companies providing information about payments made to governments, governments providing information about payments received, and civil society organizations monitoring the process independently and later producing a report which indicates any discrepancies between the two sets of data (ICMM, 2010c). The Ghana initiative has received broad acclaim as 'good practice' and has achieved greater transparency in revenue management, particularly at national scale. In particular, the Ghana example of EITI is gaining strength as a trilateral partnership model for revenue transparency. With administrative decentralization, a challenge remains for the EITI to improve the transparency of revenue management at sub-national spheres of government. One promising initiative is from Peru, where a company's foundation (the Antamina mining fund) has supplied managers to the offices of local and regional authorities in order to furnish technical assistance for managing revenue flows from mining (ICMM, 2008b).

As a whole, revenue management appears to have particularly significant scope for further action. Nevertheless, it is recognized as one of the most complex and politically delicate areas for action due to the fact that it is difficult for private companies to appear to influence a host country's decisions on public expenditure. One other 'good practice' has been drawn from the experience of the oil company, BP, in Azerbaijan, where the company leveraged existing government relationships in the country by providing technical assistance, initially on a very low-key basis by hosting meetings of experts and academics for government ministers in relevant departments.

Mining and economic development – regional development planning

In one recent contribution, 'regional development planning' was described as "an approach to making long-term plans for a country's regional development, which links feasible private sector initiatives in support of coherent and integrated, productive and social infrastructure to enable economic diversification of the region" (Essex et al., 2010). This issue is highly relevant to mining companies and governments for several reasons (ICMM, 2010b). First, because mining makes major infrastructure investments that have the potential to provide wider benefit, if planned and designed in line with

regional needs. Second, that unless efforts are made to diversify the local and regional economy, mining companies can create a situation of 'cultures of dependency', which leads to problems following mine closure.

It is recognized that mining companies have an opportunity to engage in regional development planning processes either as participants or as initiators. In relation to the first category (mining companies as participants), in theory, there is a common interest in regional development planning between regional governments, domestic civil society organizations, donor agencies and mining companies. In practice, however, there are many obstacles to overcome if the planning exercise is to be effective. In relation to the second category of mining companies initiating regional development plans, there is scope, in theory, for mining companies to have more influence over the process of regional planning, though in practice this objective would need to be balanced with that for local communities to feel a sense of ownership over the plan. Three broad different 'models' of good practice are differentiated relating to mining enterprises and regional development.

The first relates to the Australian experience and of comprehensive agreements negotiated between mining companies and Aboriginal peoples. The Australian record is important as internationally mining companies have a poor reputation for engaging with 'indigenous peoples' or lack experience in this area (Brereton, 2010). There is a rich and important literature that has documented the changing relations between mining companies and Aboriginal Australia over what Altman (2009a) describes as 'contestation over development'. Concern exists over the 'paradox of plenty' (a parallel with the resource curse thesis) whereby the existence of poverty in Aboriginal communities sits amidst the 'plenty' of mining booms in Australia. The work of O'Faircheallaigh (1995) records the growing involvement of Australian Aboriginal communities in negotiating mineral agreements with mining companies and state agencies and points to the critical questions of the bargaining of communities linked to land ownership and to community capacity to mobilize such leverage. The ICMM (2010c) considers Australia a fertile base for models relating to regional development plans as agreements between Aboriginal communities and mining tend to be comprehensive and contain a shared long-term vision for local area development which is acceptable to both communities and mining enterprises. Many of these agreements are strengthened by a tripartite element, where the regional government is a signatory or observer of the process.

Other researchers are less positive and consider the developmental outcomes of such major agreements made in Western Australia, Queensland and Northern Territory as "disappointing" (Altman, 2009b). Attention is drawn variously to the continued "distributional equity" (Martin, 2009), the limits of 'indigenous entrepreneurialism' (Holcombe, 2009; Buultjens et al., 2010), "structural constraints" on sustainable regional development (Taylor

and Scambary, 2005), and the fact that dependence on the state by Aboriginal communities "remains high and indicators have improved marginally at best" (Altman, 2009b). Trebeck (2009) highlights the significant finding that, in situations where there exist differences between mining companies and communities, "the state proves itself a poor mediator between company behaviour and the desires of local communities".

A second 'model' in relation to regional development planning is where a mining company has proactively approached a municipality and the local private sector with a view to establishing a local or regional development agency. The agency is constituted as an independent body which carries out research and implements projects on behalf of all local stakeholders, to identify opportunities for economic diversification in the area. In Brazil and Argentina, Anglo Ashanti has helped to establish and provide support to regional development agencies which have been important actors in respect of galvanizing economic diversification in their area of operations, more especially after mining operations ceased.

A third model for regional development is collaboration between a mining company and a donor organization. The experience of both Madagascar and Ghana shows the possibilities for partnerships for regional development between donor organizations and mining enterprises. The ICMM (2010b) draws particular attention to the example of Madagascar where a port was built on a public/private partnership basis, with ownership transferring to the national government post-closure.

This is considered to be "an extremely unusual but potentially highly effective model" (ICMM, 2010c), more especially as it involved the World Bank lending directly to a company (mining enterprise) rather than to a government.

Overall, therefore, in respect of regional development and mining, for mining companies the opportunities are threefold: to link mine infrastructure to wider regional planning, to participate in sub-national development planning; and to sponsor initiatives for economic diversification. Correspondingly, for governments, the challenges are to engage corporate participation in regional planning, to identify opportunities for economic diversification, and to establish or support regional or local development agencies, including those which might be business-led. The World Bank (2002b) stresses the importance of regional development planning in the context of mine closure preparation and planning. It is stated that by adopting a larger regional planning perspective – beyond that of the mine per se, stakeholders can "examine options and opportunities whereby the mining operation and its investments in human capital and infrastructure, can help meet broader development needs and create a springboard for growth in preparation for the post-closure situation" (World Bank, 2002b). Lastly, in terms of regional planning, from recent experience in Latin America there is identified the imperative to improve the

the competitiveness of the mining industry through enhancing the local business environment through better coordination of local and regional public institutions related to mining (Buitelaar, no date).

Mining and economic development – ‘growing’ local content

Although, mines are often the key economic engines of communities in which they are situated, often, the positive impacts for local communities are extremely limited due to limited spillover and multiplier impacts (World Bank, 2010). It is evident, however, that with the adoption of appropriate local economic development interventions, mining projects can bring far more than simply direct opportunities to local communities. Critically, the World Bank (2010) asserts that for the mining industry, a successful local economic development programme would improve community and employee relations, develop and deepen supplier linkages, and reduce dependence of local communities on the mine for long term economic and social well being. In addition, partnerships around local economic development can foster the growth of ‘social capital’. Over time, as a result of the consolidation of social capital “local communities can learn how to organize, how to negotiate, and how to take advantage of the opportunities offered by the mining operations to pull themselves up by their own bootstraps” (World Bank, 2002c: v).

The ICMM (2010c) considers ‘enhancing local content in the context of large-scale mining’ to refer to the sourcing of labour, materials, goods and services from small businesses and communities close to a mine site (where the exact geographical boundaries of what constitutes ‘local’ is agreed on a site-by-site basis in consultation with communities). In order to enhance local content, different partnerships are often required to ensure that local labour, materials, goods and services meet the necessary quality standards for large-scale mining companies (ICMM, 2009). Several opportunities for synergistic mutual partnerships are recognized in respect of enhancing local content. Especially in the developing world, questions of local economic development are viewed as of critical importance, particularly in the current global economic downturn. Local economic development is an issue considered also to be one of growing interest to business associations.

An array of different interventions has been identified that mining companies can make to enhance their supply chains, increase local procurement and expand the pool of skilled local employees. The argument of ICMM (2010c) is that these positive LED injections “can be most effectively undertaken in partnership with donors, local consultants and/or government agencies, technical colleges and social organizations”.

First, collective action can be taken between mining

companies on enterprise development, local procurement and employee training. South Africa is cited as offering ‘best practice’ in this regard with the mining supplier park development initiative which involves Lonmin, Anglo Xstrata and Impala working since 2008 with the International Finance Corporation (IFC) in a joint effort to build two supply parks, in North West and Limpopo provinces to create approximately 4 000 new jobs (Sanchez, 2009). This is an example of a business/government coalition to build the capacity of the supplier base for the mining industry (Invest North West, 2010). The North West mining supply park is designed to house companies that supply goods and services to the mines in the region while “offering opportunities for local partnerships and transformation” (Platinum Trust of South Africa, 2010). Supplier enterprises from Gauteng are to be encouraged to establish subsidiaries in these mining supplier parks with the attraction of business opportunities from major mining players in the region (Sanchez, 2009). It is considered that this project affords “suppliers/vendors” with a powerful marketing and manufacturing platform” offering cost savings through development of a specialized cluster of activities. The development of this platinum mine supply park in Rustenburg is being undertaken by the Bonjanala District Municipality and the Rustenburg Municipality and is coordinated by Invest North West Planning (Platinum Trust of South Africa, 2010). According to Sanchez (2009) the planning is for the first of the mining supply parks to be fully operational by 2011.

Secondly, it is recognized that in an increasingly capital-intensive mining economy, whilst the opportunities for direct job creation in mining might be constrained, the potential for indirect job creation, either through the company’s supply chain or via dedicated enterprise development initiatives, can be significant. The ICMM (2010c) applauds the Anglo American Anglo-Zimele initiative as a positive model in enterprise development with large indirect job creation spin-offs. The Anglo-Zimele initiative encompasses the establishment of an array of support programmes (include finance) for black-owned SMMEs that might be engaged in procurement for the supply chains of mining enterprises (Anglo-American South Africa and the International Finance Corporation, 2008; Anglo-American South Africa, 2008, 2009; Sanchez, 2009; Anglo-American South Africa, 2010). In similar initiatives undertaken in Chile and Ghana, mining companies are engaged in partnering with donors and others to transfer business skills in order to strengthen local SMME development through, for example, a range of business linkage initiatives.

Thirdly, the pursuit of an integrated approach towards increasing local content is a further dimension of enhancing local development impacts. In Canada, the Diavik Diamond Mine in North West Territories is identified as a potential innovative best practice as this mine applied an integrated approach to local training, employment and

procurement. This was an element of five partnership agreements which were negotiated with neighbouring Canadian indigenous communities. These agreements were made prior to the mine's construction and were to provide communities and the mine with a basis upon which to build their relationship as the project progressed from construction to operation (ICMM, 2010c). Overall, the plans formalize commitments made between the mine and were "undertaken in collaboration with a number of local partners, including government authorities and representatives of indigenous groups" (ICMM, 2010c). A commitment made to local training, local hiring and expanding local business opportunities was at the heart of the mine's operations from the outset. As an outcome of this integrated approach, 70% of the mine's procurement is regional, with a consistently high level of spending undertaken with local Aboriginal businesses, and of outsourcing 50% of the mine's workforce requirements to local and regional businesses.

A second example is offered from Ghana in the work of Newmont in establishing a linkage programme around Ahafo mine in order to maximize the business opportunities for local SMMEs as well as more broadly to seek means to increase local incomes. Among important aspects of this particular programme, was support for development of direct local suppliers to the mine; improvement in the competitiveness of local non-mining businesses in order to develop a diversified local economy outside of mining; and, improvement in the capacity of local business institutions and associations to support long term business development.

Mentoring is a vital element of the Newmont programme for linkage development and business development. Another example of innovative approaches is from Peru, where a local large mining enterprise is engaged in building the capacity of local agricultural producer to supply products to the mines canteen as well as to local hotels and restaurants (World Bank, no date).

Fourthly, in enhancing local economic development impacts through local content it is pointed out that in remote areas, often it is difficult to identify capable local partners which "can work with mining companies to increase local capacity and provide training". In this regard, the role of technical and training colleges can be important and the ICMM (2010c) draws attention to examples of partnerships between mining enterprises and technical training institutions in remote mining areas of Canada and Peru, which includes using mobile units for training in remote communities.

The opportunities for mining companies to enhance local content are essentially related to two themes. First is for innovative individual initiatives for expanded procurement from local suppliers, including through support for training, finance and mentorship of local enterprises. Second is for partnerships that go beyond individual initiative and involve wider collaboration with other mining firms in order to promote a critical mass in terms of

market opportunities for supplier enterprises to mining enterprises. For sub-national and local governments, the challenges are to deepen business development support to the mining supply chain and to improve the local business environment for private sector supply chain development.

Above all, important lessons concerning opportunities and challenges around mining and local economic development emerge from the World Bank's (2002c) analysis of experience in both developed and developing countries. Two key lessons must be highlighted:

- i. It was concluded that for local benefits to be sustainable the key factor was that of extended outsourcing with many goods and services needed by mining companies provided by local communities. In many successful cases mining enterprises play an active in improving the quality of goods and services that their suppliers provided.
- ii. A legal license to operate a mine is considered insufficient as it is averred that mining enterprises also must earn a 'social license' to operate. Ultimately, this is dependent on consultation, participation and strong dialogue and partnerships. The argument is set forth that a mining company that is about to enter a new country or region must ensure that it know about the area's social dynamics and politics.

A commitment by the company to the development of the country and region is important and the "earlier the company is perceived and understood as a member of local society, the better" (World Bank, 2002c).

Indeed, the mine enterprise must understand that the responsibility "it is about to assume in the local communities is part of its corporate ethics and that its assistance will strengthen local governance and capability to formulate projects" (World Bank, 2002c).

Mining and social investment

Social investment is defined by the ICMM (2010c) as the provision and use of finance to generate social and economic returns in the local community, typically in the spheres of health, education or housing. It is acknowledged that whilst traditionally social investment was undertaken on an ad hoc or philanthropic basis, many mining companies now adopt an increasingly strategic view of the subject. Mining companies seek to align social investments, whenever possible, with clearly-identified community needs as well as with a long-term view to strengthen community self-governance and build the capacity of local authorities to meet the local needs in order to reduce dependence on the company. That being said, it is evident that in some parts of the world, a philanthropic legacy persists and what is styled as 'social investment' may be seen only as discretionary spending

by mining enterprises.

The World Bank in collaboration with the ICMM has produced a community development toolkit which is designed to guide social investment taking place throughout the project cycle of a mine (World Bank, 2005a). Community development is defined as the process of “increasing the strength and effectiveness of communities, improving people’s quality of life and enabling people to participate in decision-making to achieve greater control over their lives” (World Bank, 2005a). The toolkit is anchored on the philosophy that ‘community development is good for business’ and by contributing to local community well-being and development, the benefits to mining companies would be: (1) enhanced reputation; (2) improved access to new mineral resources; and (3) easing approval processes and assisting in dispute resolution as better relations exist with local governments (World Bank, 2005a).

At the heart of the World Bank approach is an acknowledgement that the most sustainable legacies that mining operations can leave in community development relate to local skills and capacities through the provision of training, education, health and employment programmes for local people.

Overall, the prime aspect of a sustainable community development programme is “that it can survive without input from a mining company, especially after the mining project is finished” (World Bank, 2005a). The message is simply that mining enterprises can support community sustainability through helping “to convert one local asset, nonrenewable natural resource capital, into another local asset, sustainable human and social capital” (World Bank, 2005a).

The World Bank highlights the unique development challenges from the recent Southern African experience as having “pushed the mining industry to pioneer new forms of community engagement and social investment” (World Bank, 2005b: 10). It is added also that this has “given rise to new expectations regarding the private sector’s role in the development process” (World Bank, 2005b). Considerable acclaim is given to the new regulatory environment that has been created in South Africa through the combined Mineral Resources and Petroleum Development Act and Mining Charter. Taken together, this has provided a new regulatory framework that obligates the mining industry “to plan and operate in ways that would minimize adverse and maximize positive development impacts” (World Bank, 2005b). Of all the countries in Africa, the World Bank (2005b) considers that South Africa “has been the most explicit in articulating policies and targets relating to social and community development”.

Notwithstanding the framework provided by national government, the World Bank identifies correctly the weak spot of local government and the general lack of involvement of local authorities with mining operations “in the planning and implementation of social investments”

(World Bank, 2005b). Typically, in Tanzania, the limitations on the direct and indirect local impact of mining operations area are attributed to weak local government capacity (ICMM, 2007). Local governments are acknowledged to be both under-resourced and lacking capacity (World Bank, 2005b). The result has been the establishment of either “inappropriate development projects” or projects that have not addressed the needs of local communities. The World Bank (2005b) makes the significant observation that even in situations when local projects have had a positive impact, “the impact has often not been sustained after the company withdraws from active involvement because there has been no investment in the development of local leadership to manage the initiative” (World Bank, 2005b). In addition, limitations on local initiatives are also the result of the lack of, or poor quality of, development planning taking place at local level. The outcome is isolated pockets of success with little or no relationship to what other development initiatives may be occurring in the wider regional economy. The important policy message is that mining companies should align their social investment plans with local and regional development priorities.

The ICMM (2010c) offers a survey of a number of ‘good practice’ examples of mining linked to social investment and highlights that the major challenge now is for companies to replicate and scale-up existing programmes. It is suggested that a critical success factor is to identify innovative mechanisms which expand local ownership of projects. For example, local ownership and involvement in a road building project in mining areas of Pakistan was augmented by inviting villagers to donate portions of their land rather than through the purchase or lease of land for roads. Likewise, it is considered that “an effective social investment should be aligned with a clear business need” (ICMM, 2010c). South Africa provides examples of this in terms of the construction and maintenance of health clinics in major labour sending areas which obviously responds to the business need for employees to be in good health. In addition, there are South African cases of clinics going further to drive local development by facilitating the establishment of locally-run supplier enterprises nearby to the clinic. In the example of a clinic in the Bushbuckridge area, the health facility has stimulated local entrepreneurship to include a nappy manufacturer, a bakery and a car washing enterprise (ICMM, 2010c).

A potential for new forms of partnerships is identified between different industry (including mining) sectors, government and communities. One example of a community health centre in South Africa involves two companies (a mining company and a corporate foundation, named Virgin unite). It is considered by the ICMM (2010c) that there is further scope for fertile collaboration between different industry sectors to collaborate or partner as different industry sectors bring different skills, tools and approaches, and economies of scale can be achieved thus increasing the impact and reducing costs

for individual companies. Nevertheless, a critical factor for the establishment and consolidation of such partnerships is a capable local intermediary; in the local South African example, the key intermediary was a dynamic social entrepreneur whose creativity 'made things happen' and who manages the health project (ICMM, 2010c).

Overall, the major opportunity in social investment and community development is that of scaling up projects to support long term poverty reduction and to partner with the relevant agencies that are involved in service delivery. For governments the challenges are to engage with communities, capacity-building and to adopt a long-term approach for successful partnership in social development (ICMM, 2010c). In respect of social investments, there is a wealth of good practice for mining companies to draw from and consolidated, in part, in the World Bank community development toolkit (World Bank, 2005a, b). A major lesson offered by the World Bank (2002c) is that successful community development processes should build up human and social capital which will require management and funding. This is essential, as institutional and organizational weaknesses in local communities represent one of the key bottlenecks for local economic development and community development, and capacity building is a long-term process that can be assisted by social investment (World Bank, 2002c).

Mining and dispute resolution

The sixth and final sphere for partnership development relates to the arena of dispute resolution which is considered to involve "the development of accountability mechanisms for resolving complaints, disputes and grievances" mainly between companies and communities (ICMM, 2011b). The core opportunity is defined as that of establishing grievance mechanisms as an integral part of all stakeholder engagement and community development programmes such as those discussed earlier. It is argued by some observers that a paradigm shift is required, such as mining companies consider their operations from the standpoint of how they affect the local community and that they – the mining enterprise – are 'guests'. This type of mindset shift would demand the establishment of effective grievance procedures "as a central element of ensuring that communities feel satisfied with a company's presence" (ICMM, 2010c).

CONCLUSION

It is evident from this critical review that questions related to partnerships and mining have been on the international policy agenda for at least the past decade. An emerging consensus is that whilst there are certain common lessons that apply to all mining operations – such as the

significance of transparency and of developing appropriate partnerships – it must be acknowledged that "each mine has its own historical, social, cultural and geo-graphical characteristics that preclude the use of a one-size-fits-all prescription" (World Bank, 2002c). Another important observation from the rich cross-country comparative investigation sponsored by the ICMM is that "partnerships are not a panacea" or magic bullet and that "there are times when partnerships are not appropriate as a model for delivering results" (ICMM, 2010c). Accordingly, it is appreciated that 'responsible business practices' remain critical for mining companies to enhance their contributions to socio-economic development. From a political economy perspective, however, it would be reiterated that the activities of partnerships must be set within an institutional context in which national government supports pro-poor governance, including proactive planning and management designed to maximize poverty alleviation, the enactment of effective social and environmental policies and respect of human rights (Campbell, 2009a, b).

Overall, in terms of the six different priority areas for partnerships, the international experience points to relatively more current partnership activity in the spheres of enhancing local content or addressing poverty reduction and much less in revenue management or dispute resolution. Notwithstanding the broad range of partnership activities and of identification of 'good practice', it is cautioned that "partnerships still remain the exception rather than the rule" (ICMM, 2010c). In order to assist the broader advance of the partnership model, it is necessary therefore to expand awareness of the approach of partnerships both through the development of toolkits to facilitate partnership replication and to expand the quality of available information on partnerships (World Bank, 2005a, b). In view of the importance of socio-economic development in sub-Saharan Africa, and of the potential for expansion of mining activities, further research is required urgently, relating to the operations of mining enterprises and their partnerships in this region of the global economy.

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Review

Market potential for probiotic nutritional supplements in India

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Indian probiotic industry is evolving at a steady pace with conditions set for tremendous growth in near future. India being the largest producer of milk and having world's highest cattle population has a distinct advantage in the probiotic field along with its booming economy. Although there are quite a number of challenges in front of domestic and foreign companies entering the Indian probiotic market, the advantages associated with the industrial growth prospects outnumber the challenges in an easy and elegant way. Currently Indian probiotic industry is valued at \$2 million with a handful of players which is projected to hover around \$8-10 million in 3, 4 years. Brands that exist now in Indian probiotic industry are Nestle, Amul, Yakul Danone and Mother Dairy along with other minor players operating in different regions in their own capacities. The strong fundamental factors for the probiotic industry in India pave way for the flourishing of industry in the near future.

Keywords: Indian, tremendous growth, industrial growth, probiotic market, Nestle, Amul, Yakul Danone and Mother Dairy, producer of milk, highest cattle population, booming economy.

INTRODUCTION

'Let food be thy medicine and medicine be thy food', the age-old quote by Hippocrates, is certainly the tenet of today. With the growing interest in self-care and integrative medicine coupled with our health-embracing baby boomer population, recognition of the link between diet and health has never been stronger. As a result, the market for functional foods, or foods that promote health beyond providing basic nutrition, is flourishing. Within the functional foods, is the small but rapidly expanding arena of probiotics – live microbial food supplements that beneficially affect an individual by improving intestinal microbial balance. The first recorded probiotic was fermented milk for human consumption. After that, probiotics became popular with animal nutrition.

The role of fermented milk in human diet was known even in Vedic times. But, the scientific interest in this area boosted after the publication of the book entitled 'The

Prolongation of Life' by Ellie Metchinkoff in 1908. He suggested that people should consume fermented milk containing *Lactobacilli* to prolong their lives. Accelerated aging is because of auto-intoxication (chronic toxemia), which is due to the toxins produced by gut microflora. Bulgarian peasants who were subjected to the experiments on longevity had consumed large quantities of sour milk. The pathological reaction might be removed and life expectancy could be enhanced by implanting lactic acid bacteria from Bulgarian yogurt according to Metchinkoff et al. (1908). Since then, researchers started investigations relating to the role of lactic acid bacteria in human and animal health.

According to Pollman et al. (1980), probiotics have been used as growth promoters for lactose intolerance, anti-tumour and anti-cholesterol-lowering effects which were confirmed by subsequent studies by Garvie et al. (1984) and Gilliland et al. (1985). Probiotics have been extensively studied under *in vitro* and *in vivo* conditions by Manisha et al. (2001). The main fields of research with respect to probiotics are heart diseases, allergic reaction, cancer, diarrhea, etc. The use of probiotics resulting in

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Table 1. Commercially used probiotics *Lactobacilli* and *Bifidobacteria*.

Strain	Country	Company
<i>Lactobacillus rhamnosus GG</i>	Finland	Valio Dairy, Helsinki
<i>Lactobacillus johnsonii Lal</i>	Switzerland	Nestle, Lausanne
<i>Lactobacillus casei Shirota</i>	Japan	Yakult, Tokyo
<i>Lactobacillus acidophilus</i>	USA	Rhodia, Madison
<i>Lactobacillus casei DN 014001</i>	France	Danone
<i>Lactobacillus delbrueckii</i>	Japan	Meiji Milk Products, Tokyo
<i>Saccharomyces boulardii</i>	USA	Biocodex, Seattle
<i>Bifidobacterium longum BB536</i>	Japan	Morinaga Milk Industry

alleviation of lactose intolerance due to increased concentration of b-galactosidase in the small intestine, relief from constipation by increased bowel function (Rettiger 1921), anti-tumour activities due to inhibition of tumour cells, destruction of carcinogens, etc. have been well documented by Reddy et al. (1993) and Rowland et al. (1975). Intestinal infections caused by *Escherichia coli*, *Campylobacter fetus* subsp. *jejuni*, *Clostridium perfringens* and *Clostridium botulinum* were reduced in the presence of *Lactobacillus* supplements (Fueller, 1989). The *Lactobacillus* has shown promising results and *Bifidobacterium longum* has been successfully used to reduce the after-effects of antibiotic therapy according to Colombel (1987).

Composition of probiotics

Probiotics can be bacteria, moulds or yeast. But most probiotics are bacteria. Among bacteria, lactic acid bacteria are more popular. *Lactobacillus acidophilus*, *Lactobacillus casei*, *Lactobacillus lactis*, *Lactobacillus helveticus*, *Lactobacillus salivarius*, *Lactobacillus plantrum*, *Lactobacillus bulgaricus*, *Lactobacillus rhamnosus*, *Lactobacillus johnsonii*, *Lactobacillus reuteri*, *Lactobacillus fermentum*, *Lactobacillus del-brueckii*, *Streptococcus thermophilus*, *Enterococcus faecium*, *Enterococcus faecalis*, *Bifidobacterium bifidum*, *Bifidobacterium breve*, *B. longum* and *Saccharomyces boulardii* are commonly used bacterial probiotics (Table 1). A probiotic may be made out of a single bacterial strain or it may be a consortium as well. Probiotics can be in powder form, liquid form, gel, paste, granules or available in the form of capsules, sachets, etc.

PROBIOTIC FOOD MARKET IN INDUSTRIALIZED NATIONS

The most active area within the functional foods market in Europe has been probiotic dairy products, in particular, probiotic yogurts and milks. In 1997 these products accounted for 65% of the European functional foods market, valued at US \$889 million, followed by spreads,

valued at US \$320 million and accounting for 23% of the market according to Hilliam et al. (1998). In a recent study undertaken by Leatherhead Food RA, the market for functional foods in the United Kingdom, France, Germany, Spain, Belgium, Netherlands, Denmark, Finland, and Sweden was reviewed. The results of the study showed that the probiotic yogurt market in these 9 countries totaled >250 million kg in 1997 as per Hollingsworth et al. (1997), with France representing the largest market, having sales of ≈90 million kg, valued at US \$219 million. The German market for probiotic yogurts is growing rapidly; for example, during 1996–1997, it increased by 150%, whereas the UK market grew by a more modest 26% during the same period. On average, probiotic yogurts accounted for ≈10% of all yogurts sold in the 9 countries studied, with Denmark having the highest proportion (20%) of probiotic yogurts, followed by Germany and the United Kingdom (both at 13%) and then France (11%). Studies by Berner et al. (1998) showed that, on the lower end of the scale were the Netherlands and Belgium (both at 6%) and then Finland and Sweden (both at 5%). Seen as crucial to market expansion in Europe is further clarity on the use of health claims. The market for functional foods in Europe could ultimately account for ≈5% of total food expenditure in Europe, which, based on current prices, would equate to ≈US \$30 billion according to Young et al. (1996) and McNamara et al. (1997).

According to a new market research report, 'Probiotics Market' (2009-2014), published by Markets and Markets, the global probiotics market is expected to be worth \$32.6 billion by 2014, with the Europe and Asia accounting for nearly 42 and 30% of the total revenues respectively. The global market is expected to record a CAGR of 12.6% from 2009 to 2014. According to the report, Europe forms the largest market for probiotics with an estimated \$13.5 billion by 2014. Its 12.2% CAGR from 2009 to 2014 is driven by consumer demand for health-enhancing probiotic products, such as probiotic yogurts, other probiotic dairy products and probiotic dietary supplements. Asia is the second largest segment, growing at with an estimated CAGR of 11.2% to reach \$9.0 billion by 2014.

Probiotic dairy products are expected to command the

highest market share among all the probiotic foodstuffs, accounting for almost 70% in the year 2009 and reaching a market size of almost \$24 billion by the end of 2014. The biggest markets for these products are Europe and Asia; the U.S. market has slowly but surely opened up to these products in the recent past and is expected to grow at a CAGR of 17% from 2009 to 2014, the biggest contributor being probiotic cultured drinks followed by probiotic yogurts. Though the market base of probiotic products is comparatively lesser in the US, the market is expected to grow at an astounding rate of almost 14% in the same period driven by the large scale acceptance of - the probiotic yogurts in spoonable single serve packs, probiotic cultured drinks in single shot packaging form and probiotic dietary supplements.

The US functional foods market is comparatively under-developed by European standards, with fortified dairy products, particularly those containing active cultures, gaining popularity only recently. In contrast with the situation in Europe, there is a notable lack of development of prebiotics in the United States. Vitamin- and mineral-enriched products continue to be among the more successful functional foods in the United States. Market development has been held back by criticism leveled at companies that have introduced products bearing vociferous health claims. It is predicted that the US market for functional foods will experience the fastest growth rates compared with other countries in the future. An important aspect in this context will be the development, clarification, and testing of the laws relating to health claims. As is the case in Europe, the issue of health claims will be important for the future growth and expansion of the market for probiotics and functional foods in the United States.

INDIAN PROBIOTIC MARKET

Indian probiotic market is valued at \$2 million as per 2010 estimates and it is poised to quadruple by 2015 due to the advent of Indian and multinational companies coming in to the fray. With their advent, the Indian probiotic market turnover is expected to reach \$8 million by the year 2015. The existing probiotic market in India majorly comprises of three segments, urban chain, young adults and people with special needs such as pregnancy, lactation, immunodeficiency, geriatrics etc. India at present accounts for less than 1% of the total world market turnover in the probiotic industry and it is a huge deficit considering the fact that India has the highest cattle population and India being the world's highest milk producer.

Probiotics in India generally comes in two forms, milk and fermented milk products with the former occupying 62% of the market share and later having 38% market share (Indian consumer survey, 2010). Indian probiotic products currently are Dahi (Indian yoghurt), flavoured

milk and butter milk. Major pharmaceutical companies have become active in this space and are devising newer drugs and products, however current drugs are predominant in the area of nutraceuticals. Players are also devising packaged products like probiotic-based nutritional supplements aimed at people with special needs such as lactation, pregnancy, immunodeficiency etc.; another set of products are the over the counter (OTC) variety of probiotic formulations generally aimed at pediatric and geriatric patients.

CURRENT PLAYERS IN INDIAN PROBIOTIC MARKET

Yakult Danone

Yakult Danone India Pvt Ltd (YDIPL), is a 50:50 joint venture between Japan's Yakult Honsha and The French- Danone Group, with its offering Yakult, a probiotic drink made from fermented milk, *Lactobacillus* and some sugar. Yakult is a world leader in probiotic drinks and has a rich heritage dating back to 1935. Yakult was launched in India in the late 2007. The brand was initially available only in Delhi. Now Yakult is being launched nationally in a phased manner. Yakult is fermented milk that contains healthy bacteria *Lactobacillus casei* strain *Shirota*. According to the brand site, a 65-ml Yakult bottle contains 6.5 bn probiotic bacteria.

Yakult has been testing its marketing strategy for around a year and is now ready for the national roll out. The brand is currently available in Delhi, Mumbai, Chandigarh and Jaipur. The entry of Yakult is expected to increase the visibility and growth of probiotic category in India. What is interesting about Yakult brand is its marketing strategy. The brand has adopted a two prong strategy to crack the Indian market. Yakult has roped in actress Kajol as the brand ambassador. The brand is also making enough noise in the media. These advertisements are bound to increase the brand visibility and also may prompt consumer trials. The choice of the brand ambassador also gels with the target market. The brand predominately targets the health conscious ladies as the primary consumer. The brand has taken the positioning of a "health enhancer" and adopted the tagline "Daily Piyo, Healthy Jiyo" ("Drink daily, Win health"). The brand has the global tagline of "The kiss of good health". But a product like a probiotic drink may not be easily adopted by the consumer since she may have lot of doubts about the product. It is in this context that the brand adopted its strategy of direct marketing.

Yakult has a strategy of direct marketing where the consumers can order the product through home delivery. Yakult has a DM (Direct Marketing) team of ladies known as Yakult ladies who visit homes, educate the homemakers about the product and also regularly supplies the product. This ensures that the product is being regularly used by the consumers and also the Yakult ladies will

be able to answer the doubts of the consumers. Yakult is also available in supermarkets. Another interesting fact is about the pricing strategy of Yakult. The 65-ml bottle is priced at Rs 10 and the product is available in a pack of 5. The price sounds reasonable for those consumers who are health conscious. The main challenge for this product is to make the consumers believe that the product is delivering benefit to them. Most of the health foods have the problem of giving measurable visible results to the consumers. Yakult primarily targets those consumers who are health conscious and are aware of the importance of functional foods like probiotics. The brand will be initially operating in a niche category and its strategy will be to expand the niche category into a mainstream one. It has adopted the right marketing strategy to educate the consumers and also encourage them to make regular use of this product.

Amul

Amul was the first to foray into the category with its probiotic ice creams prolife in February 2007. Amul, on the other hand, having tasted success in the probiotics category with its ice cream in February earlier this year, is already in the process of test-marketing pouched lassi (sweetened curd) in Gujarat and some parts of Maharashtra, with plans of introducing it in the other parts of the country soon. Probiotic products contribute to 10% to its ice-cream sales and 25 per cent of its Dahi (Indian yoghurt) sales.

Nestle

Nestle, having recently declared dairy as its key area of growth, is all set to introduce probiotics in its other dairy products as well. The total packaged curd market in India is estimated at 40,000-60,000 tonnes per annum, of which Nestle has a 30 per cent market share. Internationally, the average contribution of probiotic products to total dairy products is estimated between 10 and 20 per cent depending on the country and business. Nestle also has introduced flavoured milk varieties of probiotic nature.

Mother Dairy

Mother Dairy – Delhi was set up in 1974 under the Operation Flood Programme, a wholly owned subsidiary of the National Dairy Development Board (NDDB), whose current chairman is Dr. Amrita Patel. Currently, it is one of the largest milk (liquid/unprocessed) plants in Asia selling more than 25 lakh liters of milk per day, thereby enjoying a market share of 66% of the branded milk sales in New Delhi, capital of India. Other important markets include Mumbai, Saurashtra and Hyderabad. Mother dairy ice-cream was launched in the year 1995 and has

shown continuous growth over the years, and today it boasts approximately 62% market share in Delhi and NCR. b-Activ Probiotic Dahi, b-Activ Probiotic Lassi, b-Activ Curd and Nutrifit (Strawberry and Mango) are the company's probiotic products. Probiotic products are contributing to 15% of the turnover of their fresh dairy products. Over the next 3-4 years, the contribution is expected to go up to 25% and the urban acceptance is making the company to increase their focus on probiotic products.

CURRENT STATUS OF PROBIOTICS IN INDIA

In India, probiotics are often used as animal feed supplements for cattle, poultry and piggery. This requirement is also met by importing probiotics from other countries. It is rarely used for human beings – Sporolac, *Saccharomyces boulardii* and yogurt (*L. bulgaricus* + *L. thermophilus*) are the most common ones. Sporolac is manufactured using *Sporolactobacilli*. Lactobacilli solution is an example of a probiotic, usually given to paediatric patients in India. The latest and recent addition to the list of probiotics in India is ViBact (which is made up of genetically modified *Bacillus mesentericus*), which acts as an alternate to B-complex capsules. In India, only sporulating *lactobacilli* are produced and they are sold with some of the antibiotic preparations.

India is a challenging market as it has not been exposed to probiotic products as have Western and other Asian countries. Countries like Japan, UK and some other countries in Asia have been part of the growing probiotic market since the early 1980s. But, in India, commercial probiotic foods only started cropping up on store shelves around 2007. Hence, it will be a while before we are able to overcome hurdles such as lack of awareness, retail mind set, lack of cold chain and such facilities. The global probiotic market today is \$17 billion, whereas the market size in India is just about Rs 100 crores with a handful of players. While probiotics in the form of drugs are widely accepted, probiotic foods are still viewed with scepticism. Acceptance is growing slowly, but it will be a long while before people start consuming bacteria for breakfast.

FACTORS FAVOURING INDIAN PROBIOTIC MARKET AND ITS PLAYERS

With India undergoing a rapid economic growth at a pace and with increasing number of Indian middle class population, there is a steady, increasing shift towards preventive therapies which did not exist before. People were spending only for post disease conditions out of compulsion. Increased money flow in the hands of Indian people is aimed at taking a paradigm shift towards preventive therapies in which probiotics play a prominent

role. Increase in disposable income of Indian population is another driving force which acts in favour of probiotic industry. Indian per capita income has risen to Rs.48,856 from Rs.22,792 in 1991 (Indian economic survey, 2010). When there is an increase in per capita income, it usually increases the dispensability of people's money in health benefiting sectors. Increasing shift towards self-medication is a factor which has a positive impact on Indian probiotic industry prospects. As probiotics are not purviewed under any health related law in India and with ICMR (Indian Council of Medical Research) still framing the guidelines for probiotic sales (ICMR status report on probiotics, 2009), probiotics face no hindrance from government health officials on its sales. Many elite and upper middle Indians view probiotics as self medication and their tendency to self medicate helps in the growth of Indian probiotic industry.

Increase in healthcare spending is an associated factor with increase in per capita income and ease of money dispensability. Increase in healthcare expenditure also creates the scenario for an inclusive growth in Indian probiotic market. Next important factor is the ageing population of India. It is estimated that in India, there will be an increase of 18% in the number of people in the above 60 years category by the end of this decade (Indian Bureau of Statistics, 2008). Ageing population with increased income at hand will have an ideal setting for Indian probiotic companies which produce and market specialized probiotic products meant for geriatric patients.

Pharma retail growth is the next factor touted to advance the probiotic market in India. Indian pharmaceutical industry is growing at a steadfast rate and is looking to diversify its products for catering domestic, foreign needs. Indian pharma industry is in compelling need to diversify due to the strict patent regime which came in to force on January 1, 2005. The loss in the generic drug business has to be compensated in functional food business in which probiotics is the major class of products. With retail growth in pharma field going at a brisk pace, the ease of access in case of probiotics will also grow along with it. Favorable pricing environment is also becoming possible due to number of Indian and global players entering the probiotic market. As the field is nascent, the pricing is extremely competitive taking into consideration the fact that every player in the market is trying to consolidate their consumer market base and build brand value. Any fluctuation in prices may turn away the first time consumers who are crucial for the sustained growth of the industry in a flourishing market like India where pricing plays an important role. These factors contribute to the competitive pricing which again is a factor working for Indian probiotic industry as a whole.

CHALLENGES TO BE CONSIDERED

Lack of standardization is a major challenge for the Indian probiotic industry. As the industry is in its initial

stage, there is not a proper standardization parameters present. This scenario will improve with the entry of more established players entering the Indian market and bringing standardization along with them. Lack of awareness from the lower middle class population in urban areas and rural masses may provide a rocky platform for the companies in their expansion plans. A sustained television advertisement campaign with prominent faces being roped in to promote the product may help to counter this challenge to the farthest extent since the same strategy has proved to be useful for other products which were in the same league before. Marketing and distribution challenges exist in a country like India which is very diverse and presents a topography which requires specific case studies and temperaments. Region specific marketing strategies with local sales team being involved in the decision making process will help the business cause. Involving defined strategies with positive outlook can make a difference as far as this challenge is concerned. Launching the products with Indian consumer interests in mind and forming a team of Indian sales experts by the companies will reduce this challenge in a very effective way.

CONCLUSION

Indian probiotic market presents a rosy picture in the near future. Although there are formidable challenges to be encountered, the prospects of the market expanding in a steadfast way look bright. If the companies can standardize the sales procedures, create the right kind of awareness among the Indian population especially urban lower middle class and rural masses with interwoven delivery strategies, Indian probiotic market players can surely up the ante and end up with a winning proposition. The fundamental factors like uninterrupted supply of raw materials, qualified man power, congenial investment climate with proactive government support are in place paving the way for the probiotic industry to make giant strides in Indian market. Excellent growth opportunities exist for domestic and foreign companies to capitalize the prevailing situation and produce resounding results.

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Full Length Research Paper

The prevalence of impulsive, compulsive and innovative shopping behaviour in the economic retail hub of South Africa: A marketing segmentation approach

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To date, research on impulsive, compulsive and innovative retail shopping behaviour motivated by the desire to obtain emotional, social and identity-related benefits, has largely been limited to Europe (Germany), Canada and western developed economies (the UK and USA). This article provides an initial analysis of the prevalence of impulsive, compulsive and innovative shopping traits of consumers in the economic retail hub of South Africa. More precisely, the article explores the demographic diversity in the purchase and innovative traits of Gauteng consumers. Overall, the article reveals clear disparity in impulsive, compulsive and innovative shopping behaviour across selected demographic and socioeconomic consumer segments. From a practical perspective, the marketing segmentation approach applied in this study is ideally suited for retail segmentation and marketing strategy development and serves to identify key marketplace buying behaviours. For retail, insight into buying and innovative shopping behaviour is essential for building long-term relationships with consumers and to serve their specific needs within an extremely complex and competitive retail landscape.

Key words: Impulsive shopping, Compulsive shopping, Mavenism, Oniomania, Shopping addiction, Retail therapy, Recreational shopping, Innovative shopping, behaviour.

INTRODUCTION

The Gauteng province comprises the largest source of skills and gross domestic product (GDP) in South Africa. According to Udjo (2010) almost a quarter of South Africa's labour force in 2010 resides in Gauteng. Also, more than a third of South Africa's GDP is generated in Gauteng (SAIRR, 2010) with six municipalities contributing to the province's regional gross domestic product. Moreover, Gauteng is home to 9.5 million people (or 3 million households), constituting respectively approximately a third of South Africa's income earners (34.4%) and national household consumption expenditure (34.5%) (Udjo, 2009; Masemola et al., 2010). These demographic indicators reflect Gauteng's wealthy economy where more than a third (38 %) of South Africa's top income earners reside (Van Aardt and Harris, 2008). Against this background, and not surprisingly, Gauteng is dominated by the service and retail sector that contributes

approximately 70 % to the province's economy (SAIRR, 2010). In recent years the growth of the retail industry in particular has been advanced by the continued expansion of shopping mall complexes across Gauteng as well as the surfacing and exponential growth of the Black middle class (Udjo, 2008).

Despite the positive demographic climate outlined for Gauteng, the retail sector in particular remains most susceptible to external economic forces such as the recent economic recession and increased availability of credit.

Collectively, the dynamic retail and economic landscape continuously impacts on the retail shopping behaviour of consumers across diverse demographic and socioeconomic segments. Consequently, regular consumer shopping behaviour studies are essential to distil how consumers' respond within a vibrant and extremely

competitive retail landscape.

Aim

In general, a study on consumer behaviour examines the process involved when individuals or groups select, purchase, use or dispose of products, services, ideas or experiences to satisfy needs and desires (Solomon, 2004). Retailers will only be able to effectively evaluate whether or not they are offering everything their consumers need by examining how consumers behave throughout the buying process (Nunes and Cespedes, 2003). According to Reed et al. (2000)

“it is imperative that contemporary retailers have a comprehensive understanding of consumer trends, needs, wants and the decision-making processes, all of which will have a direct impact on the success of their business.”

In support of this business philosophy, this article reflects on consumer buying behaviour in the retail shopping market of Gauteng. In order to meet consumers' needs, retailers must be aware of their buying behaviour and factors that impact on behaviour and shape their decisions. Against this background, this article investigates the prevalence of contemporary impulsive, compulsive and innovative shopping traits in the economic hub of South Africa. The study rationale has a sound theoretical basis built on the logical argument that increased buying opportunities emerge as average income increases (as in the case of Gauteng). Increased buying opportunities, due to improved income levels, are also most likely to be complemented by increased impulsive and compulsive shopping. Consequently, the study serves as an ideal platform to study the extent of overspending and shopping addiction in the well developed, extremely complex and competitive retail market of Gauteng.

Complementary to the above goals, the article aims to explore demographic shopping diversity by using a marketing segmentation approach. According to Imber and Toffler (2000) marketing segmentation is a process of dividing the market according to similarities that exist among various subgroups within the market. Also, Moroko and Uncles (2009) view marketing segmentation as a key marketing concept that relates to final consumers who differ according to their geography, purchase and usage behavior, decision-making processes, demographics, lifestyle, psycho-graphics, personality and motivation. Against this background the research uses a marketing segmentation approach that aims to establish whether impulsive, compulsive and innovative buying of Gauteng consumers differs significantly by selected demographic and socioeconomic variable. Formulated differently, the article explores the extent to which Gauteng shoppers are motivated by the desire to obtain

emotional, social and identity-related benefits.

Demographic and socioeconomic cohorts included in the analysis are gender, qualification level, population designation, lifestyle (marital status), age, economic dependence, household income and size, household occupation density as well as shopping expenditure, regularity of shopping and proximity to retail outlets. The article investigates the above selection of demographic variables along with their impact on impulsive, compulsive and innovative retail shopping behaviour. This focus originates from the inference that consumers across different demographics will have different needs and wants which may translate into different buying behaviour patterns.

Value of research

In today's increasingly complex retail environment, an understanding of consumers' buying behaviour and their knowledge of products and services is essential for high-quality business decisions and will enable retailers to segment their client base and target specific customer groups with strategies designed to meet their retail needs. Using consumer behaviour as a segmentation strategy to identify, meet and satisfy needs is an advantage to both consumers and retailers. According to Hollywood et al. (2007), a mass marketing approach is no longer viable and a segmentation strategy is considered crucial in gaining competitive advantage.

A study on impulsive, compulsive and innovative shopping also bears relevance to the ethics of marketing activities and especially sales promotions aimed at encouraging impulse buying. Knowledge of consumers' buying behaviour and self-developed knowledge can aid mall management and retail marketers in particular to develop shopping environments that better meet the needs of targeted consumers, thereby promoting their satisfaction, repeat visits and positive word of mouth. Finally, the article has value in the sense that it presents initial insights into impulsive, compulsive and innovative buying traits within the economic retail hub of South Africa.

Construct definitions

As aforementioned, this article explores dissimilarities in retail shopping traits by selected demographic and socioeconomic variable. The primary research construct and measures investigated in the study are explored in more detail:

Impulsive buying

Depending on the extent of advance shopping planning,

consumers in general can be categorised as planned, partially planned or impulse shoppers (Cobb and Hoyer, 1986; Iyer and Ahlawat, 1987; Hoyer and Macinnis, 2006). According to Halpern (1989), Johnson-Laird (1988) and Lee and Kacen (2008) a *planned purchase* is characterised by deliberate, thoughtful search and evaluation that normally results in rational, accurate and better decisions. In contrast, an *unplanned purchase* is initiated on the spot and associated with a strong urge and feeling of pleasure and excitement. This is generally known as *impulsive buying* or shopping (Rook, 1987; Billieux et al., 2008). According to Rook and Fisher (1995) and Beatty (1998) impulse buying is a spontaneous and immediate purchase where the consumer is not actively looking for a product and has no prior plans to purchase. Tendai and Crispen (2009) also state that impulsive buying can largely be an unconscious buying behaviour driven by an affective force beyond the control of an individual. Beyond spontaneity and affection, Rook (1987) and Kacen and Lee (2002) describes impulse buying as an intense, exciting urge to buy without considering the consequences of the purchase decision. On the other hand, LaRose and Eastin (2002) classify impulsive buying as one of the unregulated consumer behaviour shopping tendencies, which is milder compared to compulsive or addictive shopping. In other words, the more people make unplanned (impulsive) purchases, the closer they get to compulsive behaviour. Thus, more organised shoppers are less likely to drift into compulsive buying behaviour.

For this article the *impulsivity antecedents* include consumers' tendency to carefully manage and plan purchases, compile shopping lists and experience shopping fulfilment. These variables were included in the research instrument in the form of six statements devised to predict impulsive shopping behaviour and tendencies across demographic and socioeconomic segments.

Compulsive buying

Oniomania is the term used for the compulsive desire to shop. This concept is also commonly referred to as shopping addiction or shopaholism. Dittmar (2005) describes the core features of this phenomenon as follow:

1. The impulse to buy is experienced as irresistible
2. Individuals lose control over their buying behaviour
3. Individuals continue with excessive buying despite adverse consequences in their personal, social and occupational life and resulting in financial debt.

One of the earlier descriptions used by Faber and O'Guinn (1992) for compulsive buying is as follows:

"a response to an uncontrollable drive or desire to obtain,

use or experience a feeling, substance or activity that leads an individual to repetitively engage in a behavior that will ultimately cause harm to the individual and/or to others."

Similar to this explanation, the most recent and comprehensive definitions on compulsive buying were cited by Koran, Faber, Aboujaoude, Large and Serpe (2006). According to these researchers compulsive buying includes (i) the act of being frequently preoccupied with buying or subject to irresistible, intrusive and/or senseless impulses to buy; (ii) frequently buying unneeded items or more than can be afforded; (iii) shopping for periods longer than intended. Due to uncontrolled buying behaviour compulsive buyers are most likely to experience adverse consequences, such as marked distress, impaired social or occupational functioning, and/or financial problems. These findings build on various earlier studies by consumer researchers and psychologist especially since the 1980s. The most common view shared by these studies is that compulsive buying causes an individual to continuously make purchases regardless of financial, social or psychological consequences. The act of shopping in compulsive buying is experienced as an irresistible, uncontrollable urge, resulting in excessive, expensive and time consuming retail activity and is typically prompted by negative affectivity and results in gross social, personal and/or financial difficulties (Dittmar et al., 2007; Faber et al., 2006; Faber and O'Guinn 1989, 1992; Kyrios et al., 2004). Similar observations are shared by Damon (1988), Valence et al., (1988), Krueger (1988), Faber (1992), Faber and O'Guinn (1992), Scherhorn (1990) and Magee (1994).

In short, according to past researches, compulsive buying constitutes repeated and excessive purchases of consumer goods that may lead to behavioural disorder (eg emotional distress, depression, anxiety, boredom and anger) and impact negatively on people's lives (eg debt). Miltenberger, Redlin, Crosby, Stickney, Mitchell, Wonderlich, Faber and Smyth (2003) also refers to various previous studies that suggest that compulsive buying occurs in response to negative emotions and results in a decrease in the intensity of the negative emotions. In addition, it is important to learn from previous studies that compulsive buying does not necessarily relate to the amount of shopping or spending but rather to the consequences of shopping.

As mentioned earlier, a total of 12 measures were included in this study to explore the tendency of compulsive retail shopping in Gauteng. Among the measures, the role of credit card use in compulsive buying is explored. The rationale for including this measure is based on the pervasive view that attitudes of Gauteng consumers about debt have changed dramatically from a general abhorrence of debt to acceptance of credit as part of a modern consumer society. This rationale is

shared by Lea et al. (1995), Zuckerman (2000) and Erasmus and Lebani (2007). This suggests that overspending and excess buying has largely become acceptable. A likely negative outcome of such a culture of indebtedness (or consumption culture) is compulsive buying. According to Lo and Harvey (2011), Veludo-de-Oliveira, Ikeda and Santos (2005) and d'Astous (1990), credit cards eliminate the immediate need for money to buy something and are likely to accelerate compulsive buying.

In addition, the 'compulsive' construct also incorporates the prevalence of retail therapy and recreational shopping as a social shopping dimension. These concepts were described briefly as follows:

Retail therapy: This term refers to shopping with the primary purpose of improving a buyer's mood or disposition. Items purchased during periods of retail therapy are often referred to as 'comfort buys'.

Recreational shopping: This term refers to shopping with the primary purpose of shopping contentment. Solomon (2004) defines a recreational shopper as a person who views shopping as a fun, social activity and a preferred way to spend leisure time. Kim and Kim (2008), Odekerken-Schröder et al. (2003), Bellenger and Korgaonkar (1980) and Reynolds and Beatty (1999) further defines shopping enjoyment as a consumer's personality trait that finds shopping more enjoyable and experiences greater shopping pleasure than other consumers. This is opposed to consumers who view shopping strictly from an economic perspective, seeing it as nothing more than a means to product acquisition. According to Ahmed, Ghingold and Dahari (2007) and Chetthamrongchai and Davies (2000), recreational shoppers are more likely to engage in non-planned (or impulse) shopping.

Mavenism

A further construct used by the study to describe shopping behaviour is the market maven. Clark and Goldsmith (2005) and Bearden and Netemeyer (1999) define market mavens as:

"individuals who have information about many kinds of products, places to shop and other facets of markets and who initiate discussions with consumers and respond to requests from consumers for market information."

Mavens are especially knowledgeable about shopping and buying and obtain information because they think it will be useful to others or because it will provide a basis for conversation. Market mavens are very involved in the marketplace and are eager to share their expertise/

opinions with other consumers. Clearly, market mavens are important to retail success (of especially new products) and consequently were included in the study as an additional research construct. What makes the inclusion of this construct even more pertinent is that there is currently no consensus regarding any demographic variables that distinguish market mavens from other consumers.

In this article, the propensity to provide shopping information (mavenism construct) was derived by asking shoppers whether they (i) like telling people about new products/brands, (ii) provide information on product variety and (iii) often are requested to recommend shops, sales or best buys. For this study the mavenism construct is used interchangeably with innovative buying behaviour.

Demographic and socioeconomic variables

In order to meet consumers' needs, retailers must be aware of their buying behaviour and factors that impact on behaviour and shape their decisions. Demographic and socioeconomic factors in particular are very important in determining consumers' buying behaviour traits and will present retailers with an ideal opportunity to fulfil consumer demands and succeed in a competitive retail environment. Accordingly, this article aims to inform retailers of their customers' behaviour by examining impulsive, compulsive and innovative buying behaviour in Gauteng by selected demographic segments, including statistics such gender, qualification level, population designation, lifestyle (marital status), age, economic dependence, household income and size, occupation density as well as shopping expenditure, regularity and proximity to retail outlets. Collectively or individually, all these factors have the potential to impact on how individuals behave as consumers.

Measurement instrument

Partially adopting previously established scales, the study developed a questionnaire with three major sections. The first section contained questions designed to measure impulsive buying. The development of buying impulsiveness scales relied on the work of Fisher and Rook (1995), Weun et al. (1997), Verplanken and Herabadi (2001) and Faber and O'Guinn (1989; 1992). Based on previous research, six statements reflecting on cognitive (lack of planning) and affective/hedonic/ emotional (that is, feeling of excitement) dimensions were formulated.

It should be noted that three of the items produced reverse scores. A 7-point Likert scale was used to measure impulsive buying. To support analysis, all item scores were summed to constitute an overall composite score for impulsive buying. The scores ranged from 6 to 42 where scores closer to 42 represent greater

Table 1. Sample size by demarcated survey area.

Municipality	N	Percent
City of Johannesburg Metropolitan Municipality	170	18.3
City of Tshwane Metropolitan	171	18.4
Ekurhuleni Metropolitan Municipality	300	32.3
Sedibeng District Municipality	111	11.8
West Rand District Municipality	89	9.6
Metsweding District Municipality	89	9.6
Total	930	100.0

impulsiveness.

As part of measuring peoples buying habits, the section on impulsive buying also included three items to measure the propensity to provide shopping information (mavenism or the innovative buying construct). As with impulsive shopping, all these item scores were simply summed to arrive at a composite score for mavenism inclination. The scores ranged from 3 to 21 where scores closer to 21 represent greater innovativeness (mavenism).

The second section contained questions designed to measure a person's level of compulsive buying. Participants were instructed to respond to a series of statements regarding their consumption tendencies and rate on a 7-point Likert scale how strongly they personally agree or disagree with these statements, where 7 = completely agree and 1 = completely disagree. The 12 statements included were taken from the initial and refined compulsive consumption scale designed by Faber and O'Guinn (1989, 1992) and Valence et al. (1988).

These internationally renowned instruments focus on both financial and psychological aspects of compulsive buying and address the three core features of compulsive shopping as defined by Dittmar (2005) earlier.

Finally, all items scores were summed to constitute an overall composite score of compulsive buying.

The scores ranged from 12 to 84 where scores closer to 84 represent greater compulsiveness.

The third section was designed to capture participants' demographic and socioeconomic status.

In summary, the number of items for each dimension is given in Table 5.

The reliability of the instrument was also checked by means of SPSS.

The value of Cronbach's alpha for the impulsive, compulsive and innovative buying scales was 0.640, 0.835 and 0.960 respectively, which confirmed the reliability of the instrument. The Alpha for the compulsive buying scale in particular was even slightly higher than the reliability of previous studies conducted by Faber and O'Guinn (1989; 1992).

METHODOLOGY

A quantitative research approach was used to conduct landline

telephone interviews with 920 households in Gauteng. The geographic spread of the survey population, high security measures inhibiting entrance to most residents located in the crime infested Gauteng province as well as high landline telephone ownership in Gauteng, all contributed to the final decision of favouring landline telephone interviews as the most appropriate data collection method.

To support the selection of the sample units (households), a multi-purpose sampling approach was used. Sample units were selected from local telephone directories (sample frames) applicable to the Gauteng province. The boundary demarcation of the Municipal Demarcation Board of South Africa (2006) was used for sample zoning purposes (Figure 1). This supported the use of systematic sampling of a predetermined quota of household sample units within each of the municipal areas targeted by the study. Thus any households located within the demarcated municipal boundaries of the Gauteng province were classified as eligible sample units. Ultimately, the household member mostly responsible for grocery shopping qualified as final sample element (respondent).

Furthermore, since culture was identified as a potential differentiating factor in measuring service quality in the grocery retail industry of Gauteng, the sampling approach used quota selection based on 'family name' identification. For this purpose a list of family names, which typify certain cultural group in South Africa, was constructed and provided to interviewers to ensure quota control of cultural groups to be included in the final sample.

The final sample size by each of the demarcated municipal areas is summarised in Table 1.

The table reflects the outcome of the stratified sampling approach used to ensure proportional distribution of the sample by municipal area.

The demographic and socioeconomic profile of the Gauteng survey population who participated in the study is reflected in Table 2. The apparent gender bias towards female participation in the study as displayed in Table 2 is due to the fact that most females still take responsibility for household shopping. In fact, for this study 84% of the households indicated that females are mostly responsible for shopping while only approximately 13% of males take primary responsibility for shopping.

RESULTS AND ANALYSES

Once the data were collected and verified, responses were coded and entered into the Statistical Package for Social Sciences (SPSS) for data mining and analysis purposes. An ANOVA analysis was used to test for significant differences within and between the buying traits and each of the demographic and socioeconomic variables. The outcomes of the ANOVA test to reflect on statistical significance within and between impulsive,

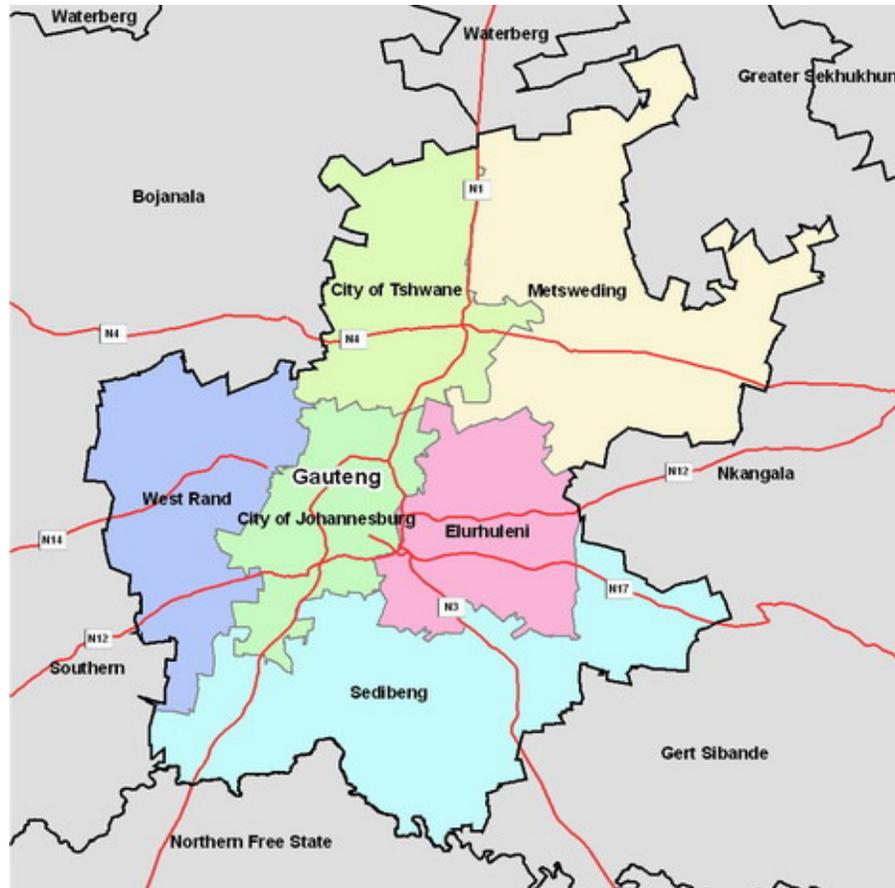


Figure 1. Gauteng municipal boundaries.

compulsive and innovative buying and each of the selected demographic and socioeconomic groups are displayed in Table 3.

For each construct measured in the study, the following can be deduced from the significance analysis presented in Table 3.

Impulse buying

Higher qualified households, designated culture groups, own income and salary earners, relatively higher income and lower occupancy households as well as households spending relatively more, who shop daily and reside relatively closer to shopping destinations, plan their shopping less carefully. These individuals/households are also more susceptible to impulse shopping. These findings are confirmed at a 95% level of confidence.

Compulsive buying

Designated, unmarried and younger consumers, households with higher occupancy rates, who spend relatively

less on shopping and visit shopping complexes less often, are more likely to be predisposed to compulsive shopping. These findings are confirmed at a 95 % level of confidence.

Innovative buying (Mavenism)

Lower qualified people and designated households are more inclined to provide shopping information to others (that is, family, friends and colleagues). Also, younger consumers who are not married but dependent on friends, family or the government for an income regard themselves as more knowledgeable about shopping and buying and are eager to share their expertise/opinions with other consumers. Lower income consumers who reside in households with relative more residents seem more eager to tell other people about new products/brands. Households with relatively fewer rooms, who spend relatively less on shopping on a monthly basis are more likely to provide information on product variety. Those who are more often requested to recommend shops, sales or best buys are those who travel further to shop.

Table 2. Demographic and socioeconomic profile of survey population.

Variable	Descriptive statistics
Gender	Male (19.5 %); female (82.5 %)
Qualification	Primary education (7.7 %); Secondary education (66.2 %); Tertiary education (26.0 %)
Culture group	Designated group ¹ (51.9 %); Non-designated group ² (48.1 %), ¹ African, Coloured, Asian; ² White
Lifestyle	Married (62.8 %); Unmarried (37.2 %)
Age	Younger consumers ¹ (36.1 %); Middle-aged consumers ² (42.8 %); Older consumers ³ (21.1 %) ¹ <40 years; ² 40-60years; ³ 60+ years
Economic dependence	Independent ¹ (54.1 %); Dependent ² (45.9 %) ¹ Own business or salary earner; ² Dependent on family, friends, government
Household income	Lower ¹ (20.5 %); Low middle ² (40.9 %); High middle ³ (24.4 %); Higher ⁴ (14.2 %) ¹ <R3500 pm; ² R3500-R20000 pm; ³ R20000-R40000; ⁴ R40000+
Household size	Small ¹ (30.1 %); Medium ² (41.5 %); Large (28.4 %), ¹ 1-2 residents; ² 3-4 residents; ³ 5+ residents
Occupation density	Small ¹ (31.1 %); Big ² (69.0 %), ¹ 1-2 bedrooms; ² 3+bedrooms
Shopping expenditure	Lower ¹ (74.2 %); Higher ² (25.8 %), ¹ <R3000 pm; ² +R3000 pm
Shopping regularity	Daily (12.6 %); Weekly (38.0 %); Monthly (49.5 %)
Proximity to retail outlets	Closer ¹ (85.2 %); Further ² (14.8 %) ¹ Within 10km from closest shopping complex; ² Further than 10km from closest shopping complex

Study comparisons

It is interesting to note from the analysis that gender does not have a significant effect on compulsive buying tendencies. This finding differs from the work by Dittmar et al. (2007), which shows that women are more prone than men to compulsive buying behaviour. However, similar studies by Koran et al. (2006) show that this is not the case. Also, the study by Billieux et al. (2008) confirms that the prevalence of compulsive buying in males and females is very similar. The findings of this study also differ from that of Cobb and Hoyer (1986) who found that women are more likely to plan their purchases than men. Block and Morwitz (1999) contend that females are more inclined to plan their shopping since they are traditionally in charge of the shopping and correspondingly know more about stores and products and have better ideas about inventory levels than males. Their research also reflects a higher probability of women preparing a

shopping list and consequently exhibiting lower levels of compulsive purchase behaviour than males. These findings should also be contextualised against the background that the traditional housewife is a 'disappearing' phenomenon in South Africa and Gauteng in particular. Nowadays, household chores are split more evenly with expertise equally divided between husbands and wives.

The results of this study also show and confirm that as a consumer becomes older their retail buying behaviour changes. As people grow older they become more risk-averse and, hence, less inclined to buy compulsively. The findings of the study reflecting on age as differentiator for buying traits, largely correspond with those of Dittmar et al. (2007), showing some indication that younger persons may be more susceptible than older ones to compulsive buying tendencies. Despite the age similarities notable from both these studies, several others found no effect/influence of age on problematic buying/compulsive buying tendencies (Billieux et al., 2008). Also in this

Table 3. Significance of survey results.

Variable	Construct		
	Impulsive buying	Compulsive buying	Mavenism
	Leading variable	Leading variable	Leading variable
Gender	Male	Male	Male
Significance (p; F)	0.583; 0.301	0.691; 0.159	0.193; 1.699
Qualification	Tertiary	Primary	Primary
Significance (p; F)	0.003; 5.974*	0.336; 1.093	0.000; 21.717*
Culture group	Designated group	Designated group	Designated group
Significance (p; F)	0.002; 9.729*	0.000; 190.539*	0.000; 941.982*
Lifestyle	Not married	Not married	Not married
Significance (p; F)	0.683; 0.167	0.002; 9.390*	0.000; 70.773*
Age	Younger consumers	Younger consumers	Younger consumers
Significance (p; F)	0.088; 2.436	0.000; 32.961*	0.000; 37.050*
Economic dependence	Independent	Independent	Dependent
Significance (p; F)	0.000; 13.436*	0.059; 3.587	0.013; 6.238*
Household income	Higher income	Middle income	Lower income
Significance (p; F)	0.000; 21.688*	0.119; 1.958	0.000; 60.396*
Household size	Small household	Medium household	Large household
Significance (p; F)	0.000; 7.763*	0.000; 16.367*	0.000; 40.067*
Occupation density	Big household	Big household	Small household
Significance (p; F)	0.533; 0.389	0.339; 0.914	0.002; 9.977*
Shopping expenditure	Higher spenders	Lower spenders	Lower spenders
Significance (p; F)	0.000; 16.128*	0.000; 42.597*	0.000; 143.981*
Shopping regularity	Daily	Monthly	Monthly
Significance (p; F)	0.002; 6.525*	0.000; 44.257*	0.000; 171.624*
Proximity to retail outlets	Closer	Further	Further
Significance (p; F)	0.021; 5.366*	0.085; 2.972	0.000; 28.346*

*Significant at a 95% level of confidence

study, gender, educational qualification levels, economic dependence, household income and occupation density and shopping facility proximity have no significant effect on problematic (compulsive) buying. With specific reference to compulsive shopping across income group, this study could not provide any significant results, as is the case in the USA where empirical studies by Kuzma and Black (2006) revealed that the most extreme compulsive buyers have the lowest income. This suggests that a lack of money does not prevent compulsive shopping.

Finally, the study outcomes partially correspond with

the research by Kollat and Willet (1967) who found that the increase in size of the grocery bill and the number of purchases made, correlated with an increase in unplanned impulse purchases. For the Gauteng study, higher spending households seemed less inclined to plan shopping.

CONCLUSION AND RECOMMENDATIONS

This study aimed to unveil significant statistical differences in buying traits of consumers by selected demographic and socioeconomic variable and to uncover

Table 4. Minimum and maximum scores.

Construct	Minimum	Average	Maximum	Intensity index (%)
Impulsive buying	6	21	42	42
Compulsive buying	12	46	84	47
Innovative buying	3	15	21	67

Table 5. Number of items for each dimension.

Construct	Measure/item
Impulse buying	6 items
Compulsive buying	12 items
Mavenism	3 items

any signs of shopping addiction occurring in Gauteng. This study conclusively revealed no significant or severe form of impulsive or compulsive shopping behaviour among Gauteng shoppers. This view is supported by the following minimum, average and maximum impulsive, compulsive and innovative buying scores emerging from the study.

Table 4 show the minimum and maximum scores returned by the study for each of the measurement constructs. The intensity index has been computed by judging the location of the average score within each score range. For example, the average score for impulsive shopping is closer to the minimum and located further from the maximum impulsive score, reflecting lower-order impulsive buying behaviour. Using location variance, an intensity index for each construct has been computed with values closer to 'zero' reflecting a less severe form of buying behaviour while index scores closer to '100' reflects more severe forms of buying behaviour.

It is clear from this analysis that Gauteng shoppers can be classified rather as modest planners (impulsive intensity index = 42). This finding suggests that Gauteng shoppers plan their shopping reasonably well and make use of an informal or formal shopping list in planning shopping.

This also suggests that Gauteng consumers buy familiar products and mostly plan their purchases. The rushed lifestyles of Gauteng residents and bad-debt aversion, probably best explain this consumer trait. However, Gauteng shoppers generally enjoy shopping, which in many cases could be viewed as a strategy to relieve work stress or monotony (especially among unemployed and low income groups). Also, an increase in the number of shopping centres in Gauteng and people's urge to visit and experience these centres have further contributed to shopping enjoyment (intensity index = 67). Shopping excitement, as noted from the survey

findings, show that Gauteng consumers seem most willing to share their shopping experience with others and regard themselves as good product/brand informants (shopping innovators) who are well positioned to recommend products and where to shop to others.

The hedonic aspect of compulsive buying, namely shopping enjoyment (anticipatory pleasure related to buying) also featured prominently in the measurement of compulsive buying. However, although Gauteng shoppers seem to enjoy shopping and often engage in retail therapy to make them feel better (an additional hedonic aspect of compulsive buying), they seldom experience depression when returning from shopping. The study revealed that the recent economic recession in South Africa has largely prevented Gauteng shoppers from purchasing items that they cannot afford. This largely clarifies people's abstinence from binge buying or simply spending all their money at month end. In fact, the study reflected debt aversion among consumers, most likely a consequence of the new credit regulations introduced in South Africa in 2008. This may also explain the research finding that consumers like buying goods on sale. The fact that Gauteng shoppers claim to have no major post-purchase guilt further confirms low compulsive buying tendencies.

In view of the relatively low number of Gauteng consumers reporting compulsive buying behaviour in this study, it is clear that dysfunctional shopping behaviour has not yet reached the same levels in South Africa when compared to abroad (Europe, Canada, UK and USA). The compulsive intensity index score (47) clearly reflects relatively low occurrence levels of overspending or compulsive buying tendencies in Gauteng. Thus, compulsive buying behaviour is not currently viewed as problematic. As reflected in this article, there are currently no significant signs of serious shopping addiction in Gauteng, although certain demographic and socioeconomic groups seem more susceptible to some form of impulsive and compulsive buying. In a dynamic retail market, and with research on compulsive and impulsive buying still in its infancy stage in South Africa, the propensity towards compulsive buying may intensify or wane, depending on the extent of advertising, marketing and the increased availability of online shopping.

Besides a need for continued monitoring of buying traits of Gauteng shoppers, similar research is suggested for other regions in South Africa to estimate the prevalence of impulsive and compulsive buying. Such an

approach will ideally support comparative analysis of prevalence estimates for compulsive buying, which currently range from 1 to 10% of adults in western developed economies such as the UK and US (Dittmar, 2005). Research for establishing differential roles of geographic and socioeconomic factors across product category and retail type would also be valuable and contribute to the knowledge pool of consumer behaviour. In the interim, the study presents useful findings on buying traits in Gauteng for the retail industry to improve their segmentation and marketing strategies, built on moral principles that would benefit both retailers and the consumer alike.

Finally, the study builds on and contributes to the knowledge pool on consumer behaviour in South Africa and reflects on the prevalence of buying traits and propensity of consumers to provide market information.

The findings are also important methodologically as they reinforce and support the reliability and validity of previous buying behaviour measurement scales used in similar studies abroad. Ultimately, it is anticipated that the research will not only apply and be useful to the retail industry, but is also likely to also impact on the field of social psychology.

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Full Length Research Paper

Exploring the influence of enterprise resource planning (ERP) implementation on corporate performance using a modified data envelopment analysis (DEA) approach

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The benefit of enterprise resource planning (ERP) system for corporate performance is almost ignored at earlier works. To advance earlier researches, this work employs financial data to explore factors of performance advance by illustrating the association between operation management and ERP installation. A two-stage analysis is made to achieve the aim. Firstly, input-output efficiency of a firm is evaluated based on a modified data envelopment analysis (DEA) approach, which controls the variations of macroeconomic prosperity among sample years. Secondly, exactly how the embedded modules of ERP systems enhance the input-output efficiency of a firm is then explored by performing Tobin regression analysis. Comparing the input-output efficiency between the pre-ERP and post-ERP periods, the input-output efficiency is proved to be higher in the post-ERP period since firms benefit from shorter turnover days of account receivable and inventories, as well as longer unpaid accounts turnover days after installing ERP. In addition, Tobit regression results indicate that acceleration of account collections, reduction of inventory levels and consulting support of leading vendors improve the input-output efficiency of the firms. This finding suggests that operational improvement owing to implementation of ERP systems increases the corporate performance.

Key words: Enterprise resource planning (ERP), leading vendor, Tobit regression, data envelopment analysis (DEA), turnover.

INTRODUCTION

The extent to which enterprise resource planning (ERP) system enhances the corporate performance has seldom been addressed in pertinent literature. By extending the results of previous efforts, this study evaluates input-output efficiency during implementation of ERP by using financial data. The proposed DEA model evaluates sample firms that are implementing ERP systems by attempting to determine which sample firm achieves the largest outputs in the corresponding scale of intermediate and primary inputs. The "production frontier", the most productive benchmark, is estimated based on the DEA approach. Input-output efficiency can then be determined according to the distance between its data point to the "production frontier". Input-output efficiency score is thus the quantitative and objective criteria of corporate performance.

In contrast with previous research focusing on questionnaires or cases to describe the features of ERP (Kositanurit et al., 2006; Hsu et al., 2008), this study

elucidates four research questions based on the input-output efficiency calculated by the modified DEA approach as an indicator of corporate performance. The first research question examines whether significant input-output efficiency differences occur when a company implements ERP systems. As commercial software packages, ERP systems provide cross-organization integration through embedded business processes, generally comprising several modules, including logistic, procurement, sales, marketing, human resources and finance (Davenport, 1998). The ERP platform supports transaction processing, real-time visibility, and cross-functional business process (Weill and Vitale, 2002). ERP systems are thus expected to enable enterprises to produce a higher output in the corresponding scale of inputs. However, empirical insight into how ERP impacts input-output efficiency is limited. Quantitatively comparing pre-ERP and post-ERP input-output efficiencies is thus of worthwhile interest. The second research question

explores how an ERP system can improve the input-output efficiency of a firm. ERP fosters a paperless environment, provides efficient inventory monitoring and selection), reduces lead time and increases inventory accuracy (Bose et al., 2008). Inventory levels are expected to decrease, while sales per employee are likely to increase up to approximately 50% due to ERP implementation (Schaeffer, 1996). In particular, ERP systems even facilitate other coherent business strategies, including total quality management, supply chain management, and activity-based costing strategies (that is, Lea, 2007; Bose et al., 2008; Tarantilis et al., 2008; Li et al., 2008). Although this study discuss how ERP reforms the operation management of a firm, business owners still do not adequately understand how ERP systems can benefit the performance of a firm. By extending the results of above studies, this investigation examines whether ERP-driven reforms of operation management enhance the input-output efficiency of a firm.

The third research question further elucidates whether firms that implement ERP software packages from leading vendors can more significantly increase input-output efficiency than the software packages of other vendors. Ranganathan and Brown (2006) indicated that leading ERP vendors embed their cumulative knowledge and experiences in their ERP packages, explaining why effective ERP systems are more likely to be implemented out under leading vendor consultation. Given the importance of selecting an ERP vendor, this study examines whether leading ERP vendors contribute to the input-output efficiency of a firm.

The fourth research question ascertains whether electronics firms perform better than those not belonging to the electronics industry, given the importance of implementing ERP among Taiwanese electronics firms. In addition to its robust economy, Taiwan has a globally leading electronics industry as a supplier of computer monitors and PC manufacturing. Owing to tremendous amount of electronics product exports, Taiwanese electronics firms rely more on ERP platforms to integrate sales or purchase orders from global branches than firms not belonging to the electronics industry do. Electronics firms would thus find it more beneficial to implement ERP systems. Comparing improvements in input-output efficiency of electronics firms with those of non-electronics ones reveals the specific roles in which ERP systems play in such an export-oriented industry to which Taiwan electronics firms belong.

To answer the above research questions, this study has the four following objectives. First, based on previous theory, this study compares how pre-ERP and post-ERP periods differ in input-output efficiency. Second, this study examines which domains of operation improvements to attribute to advances in input-output efficiency based on ERP systems. Since such improvements in operation management include the acceleration of

account collection from customers, reduction of inventory levels and flexible payments to suppliers, this study attempts to represent improvements in inventory management, accounts receivable management and accounts payable management by using the inventory turnover day, accounts receivable turnover day and accounts payable turnover day, respectively. This study also examines how input-output efficiency and these three turnover day variables are related. Third, this study attempts to determine the importance of leading ERP vendors in terms of elevating the input-output efficiency of firms. Finally, this study compares differences in input-output efficiency improvement between electronics and non-electronics firms belonging to the Taiwanese industry.

The aforementioned objectives of this study are achieved based on two-stage analysis. During the first stage, changes in input-output efficiency after firms implement ERP systems are analyzed based on data envelopment analysis (DEA). By using the DEA approach, Sufian and Habibullah (2009) examined efficiency in a bank for several consecutive years. However, that study did not incorporate the variations of macroeconomic status among sample years. In this study, the sampled firms adopted ERP in different years. In this manner, firm efficiency was likely to vary with macroeconomic conditions. Therefore, the influences of macroeconomic prosperity must be adequately controlled when determining firm efficiency. Banker and Morey (1986) suggested evaluating firm efficiency by considering exogenous input variables and controllable factors individually, owing to at firm-specific inputs, that is, labor, capital and raw materials, are discretionary under managerial control while macroeconomic prosperity factors are not. This study examines the role of uncontrollable macroeconomic prosperity by applying a modified DEA model of Banker and Morey (1986), which involves the use of exogenous variable and gross domestic product (GDP) values.

During the second stage, Tobit regression analysis is performed to regress the input-output efficiency scores on operational improvement indicators in the control of ERP vendor characteristics and industrial factors. Given that these operational improvement indicators include turnover days of inventory, accounts receivable and accounts payable, this study can determine whether a better sale or procurement order operations should be attributed to input-output efficiency improvements after ERP implementation.

Based on 470 firm-year observations of Taiwanese firms that implemented ERP systems, empirical results indicate that ERP systems yields a substantial boost in efficiency. Superior levels of functional integration also appear under ERP implementation. The turnover days of accounts receivable and inventory are reduced, while turnover days of accounts payable are prolonged. Additionally, according to our results, the performance of

firms adopting ERP is negatively correlated with accounts receivable turnover days and inventory turnover days. Since ERP can easily solve the problem of surplus or shortage of inventory in factories, the inventory turnover days can be curtailed after the adoption, leading to a superior performance. Moreover, firms adopting ERP systems can integrate client orders from various branches effectively and reduce the number of accounts receivable turnover days, ultimately increasing input-output efficiency. Furthermore, the performance of ERP-equipped firms is positively related to accounts payable turnover days. Capable of postponing their payment to suppliers after implementing ERP, enterprises can utilize a more flexible cash flow and increase their input-output efficiency.

Hypotheses development

Evaluation of how ERP impacts the input-output efficiency of a firm

ERP systems can integrate all departments, including production, sales, material, quality control, finance management, accounting management and information management. Streamlining their operations makes internal management more efficient and upgrades customer service, ultimately satisfying the requirements of rapidly evolving business operations (Davenport, 1998). Cotteleer and Bendoly (2006) elucidated how ERP fosters operational management by comparing pre-ERP and post-ERP order flows. For companies without ERP systems, before the sales office recognizes their sales, each order must be confirmed through the respective manufacturing/distribution centers (MDCs) to ensure that product commitments are met. Logistics personnel must track inventory across MDCs manually, subsequently incurring significant order delays. Conversely, once a firm adopts an ERP application to replace its outdated seniority system, this ERP formula allows the information system to integrate sales information in various regions (e.g., Asia, Europe and North America) via the Internet, thus streamlining enterprise-level transactions. Importantly, ERP systems facilitate a greater awareness of problems and improve fulfillment lead-time, thus allowing firms to commit to orders in real time from anywhere globally. Therefore, in addition to providing the linkage and integration of various enterprise segments, ERP systems decrease the cost and time of data exchange, likely enhancing firm performance as a result (Hitt et al., 2002; McAfee, 1999). Elaine (1997) even indicated that firms having implemented ERP systems have an increased productivity rate, efficient auto-manufacturing scheduling, unduplicated information, improved data sharing and reduced costs in human resources. ERP systems are thus expected to enable enterprises to produce higher outputs in the corresponding scale of inputs.

Restated, ERP can raise the input-output efficiency score compiled by the DEA approach. As for the first research question as to whether substantial differences in performance arise when a company does and does not implement ERP systems, we hypothesize the following:

H₁: Substantial differences in input-output efficiency arise in a firm between pre-ERP and post-ERP era.

Determinants of improved input-output efficiency under ERP systems

Previous studies confer that ERP enables all products to be manufactured and sold in a short operation cycle (Bose et al., 2008). The operational cycle refers to how many days are required for a company to transform purchases of inventory into cash receipts from its eventual sales; in addition, it is equivalent to the inventory turnover days plus accounts receivable turnover days minus accounts payable turnover days. From the operation cycle, we can infer that business consists of inventory management, accounts receivable management and accounts payable management. This section analyzes what factors increase input-output efficiency of firms that implement ERP systems in terms of these three operation management types.

Referring to accounts receivable management, ERP systems can customize the accounts receivable module according to the business processes and collect unpaid customer invoices of credit sales timely. The accounts receivable levels can thus be easily reduced, helping us to avoid large bad debts and reduce the number of accounts receivable collection days. For instance, after Arizona Electric Power Corporation implemented the J. D. Edwards ERP system, the days required to close sales reduced from 38 days to only 9 days, while the work order eased from 30 days to 2.5 days.

Figure 1 displays the average turnover days of Taiwanese firms before and after implementation of ERP systems in our sample firms. According to Figure 1, accounts receivable were reduced from 68 days (two years before implementing ERP) to 52 days (six years after implementing ERP). Our results thus demonstrate that implementing ERP can reduce the number of accounts receivable turnover days, thus improving the operation management of a firm. As for our second research question whether a company enhances input-output efficiency by improving accounts receivable management, we hypothesize the following:

H_{2a}: Reducing the number of accounts receivable turnover days caused by implementing ERP can increase input-output efficiency.

As for inventory management, Stratman and Roth (2002) indicated that ERP systems integrate information of

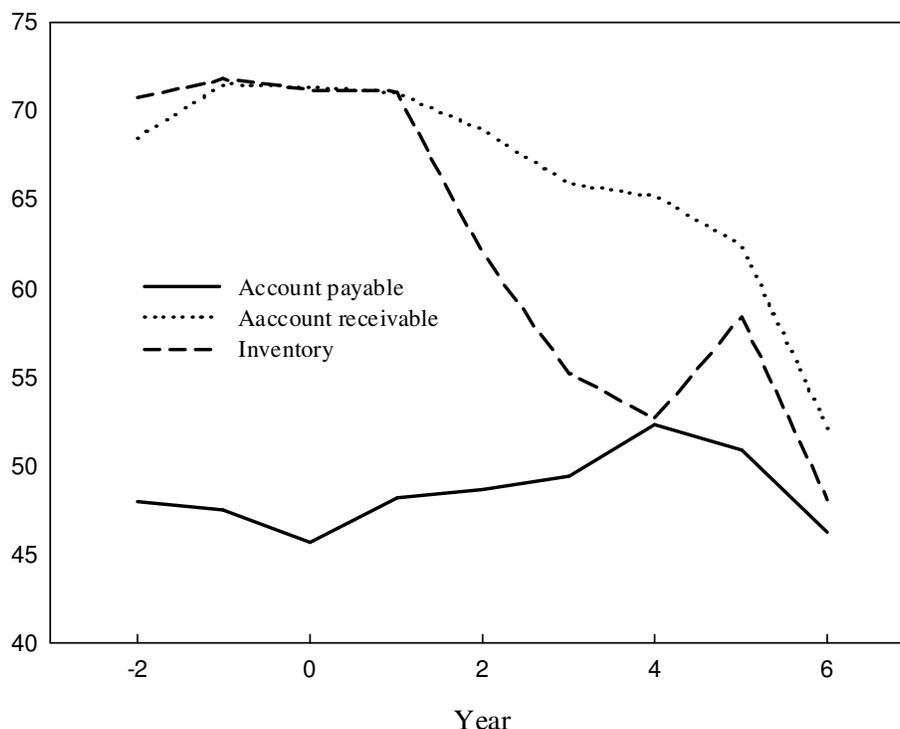


Figure 1. Accounts receivable, accounts payable and inventory turnover days during pre-ERP and post-ERP implementation periods. The ERP implementation years are set year 0. Negative years represent years prior to the ERP implementation year and positive years represent years subsequent to the ERP implementation year.

production, costs, market forecasting and inventory management, subsequently leading to a balanced production and an increased cash flow and ultimately elevating the market competitiveness of a firm. The American Production and Inventory Control Society issued an analytical report in 1997, indicating that firms with ERP systems have a 60% lower inventory time than its competing rivals. According to Michael (1998), ERP systems increase the accuracy of inventory records to 98.5%, as well as decrease the inventory stock by 20%. Moreover, according to Seifert (1993), ERP systems can also decrease inventory turnover days and subsequently lower inventory costs.

According to Figure 1, inventory turnover days of Taiwanese firms were 70.74 days two year before implementing ERP systems. Following implementation for six years, the systems could reduce the number of inventory turnover days to only 48.03 days. This evidence confirms that implementing ERP can reduce the number of inventory turnover days. Through ERP systems, firms can integrate information systems and create a platform for transparency in data exchange rendering. Consequently, firms can respond to market fluctuations in real time and adjust its inventory, subsequently lowering inventory risks and increasing efficiency across the firm. With the intention of investigating how the number of inventory

turnover days affects the efficiency after implementing ERP systems, we hypothesize the following:

H_{2b}: Reducing the number of inventory turnover days caused by implementing ERP can increase input-output efficiency.

ERP systems provide a uniform IT application platform of back-office functions that facilitate technical and business integration (Weill and Vitale, 2002). Gattiker and Goodhue (2000) suggested that ERP systems could enhance data visibility across a firm and increase the accuracy and integration of account payables, salary expenses, and tax payables, thus leading to more efficient enterprise-level transactions. According to Figure 1, accounts payable turnover days of Taiwanese firms increased from 45.65 days during the year in which firms implement an ERP system to 52.32 days after implementing ERP systems for 4 years. A longer turnover day of accounts payables implies a more flexible capital flow. Once the accounts payable turnover days are prolonged by the ERP system, input-output efficiency can be increased by hypothesizing the following:

H_{2c}: Prolonged accounts payable turnover days caused by ERP implementation can increase input-output

Table 1. Profitability indexes of listed companies and electronics corporations in Taiwan

Electronics firm (N=9,126)	Gross margin	Operating income	Pre-tax income	Earnings per share
Mean	732,824	342,382	379,668	2.0271
Standard deviation	4,102,553	2,876,436	3,103,379	4.9624
Total listed firms (N=18,731)				
Mean	723,372	321,796	362,161	1.7045
Standard deviation	3,307,590	2,332,785	2,617,667	4.5385

N=Number of observation

efficiency.

Designing large and complex enterprise integration solutions is extremely difficult owing to the constraints from the current set of legacy applications (Umapathy et al., 2008). ERP implementation projects may have a high probability of failure because enterprises lack experience in implementing ERPs, especially before 2000. For instance, FoxMeyer Drugs and K-Mart Corporations experienced failure in implementing ERP, leading to bankruptcy thereafter. With these two circumstances, firms under ERP systems neither obtained nor reached its efficiency potential (Al-Mashari, 2000; Kumar and Hillegersberg, 2000). Nevertheless, implementing ERP systems takes a considerable amount of time and a substantial amount of capital investment (Bailey, 1999; White et al., 1997; O'Leary, 2000; Escalle et al., 1999). The lack of experienced consultants imposes barriers to successfully implementing ERP systems, explaining why insufficient experience in implementing ERP increased business risks before 2000 (Ausin and Cotteleer, 1999). Given the widely recognized difficulty in implementing ERP, success depends on expert knowledge and the technical skills of third party consultants (Oesterle et al., 2000).

As a great deal of firms begin to implement ERP systems, ERP vendors cumulate more experiences to embed knowledge in process templates by means of packaged application (Scheer et al., 2000). The abundant experiences of leading vendors are likely to decrease the likelihood of failure when implementing ERP. Ranganathan and Brown (2006) asserted that in addition to developing templates based on optimum practices, such experienced vendors also provide preliminary and continuous technical support, frequent upgrades with improved technical and business capabilities, as well as new modules to extend the range of information technology platforms. Thus, the market values were expected to increase for firms that had announced their intentions to install ERP packages provided by a leading vendor (that is, SAP or Oracle) from 1990 to 1998 (Hayes et al., 2001). Namely, investing in an ERP package of a leading vendor increases the likelihood of adopting the optimum practices for a cross-functional business, subsequently increasing the potential benefits of integration. We thus

hypothesize the following:

H₃: Leading ERP vendors increase input-output efficiency at a greater degree than other vendors.

Taiwan firms hold the largest share of the global market in IC manufacturing, packaging, and testing, and in 2004, Taiwan's IC design industry was ranked number two in the world (Tsai, 2010). The hi-tech electronics industry in Taiwan has accounted for a significant proportion of the national GDP in recent years. For instance, the production value of the hi-tech industry leaped from 35.3% of total production in 1991 to 54.2% in 2004. This statistic reflects the entry of Taiwan into a hi-tech based economy. Table 1 indicates that standard deviations of profitability indicators, that is, gross income, operating income, pre-tax income and earnings per share, are greater in electronics corporations than those in non-electronics industries. Table 1 also reveals that gross income and pre-tax profit in the Taiwanese electronics industry fluctuates considerably more than they do in non-electronics industries. Given the short product life cycle in the electronics industry, profit variation and business risk also fluctuate much more. Therefore, the electronics industry requires more flexible cash flow management to reduce its risks. As is well known, ERP systems enable the integration of the entire order flow, including production, sales, human resources, research and development and finances. Such systems could facilitate manufacturing management in the electronics industry.

According to Lang and Warfield (1997), the capital market often evaluate electronics industries in higher values by considering non-financially related information such as the implementation of ERP devices. Therefore, this study thus compares how the electronics and non-electronics industry differ in input-output efficiency to investigate whether input-output efficiency of hi-tech electronics industries is superior to that of non-electronics industry after implementing ERP systems. We thus hypothesize the following:

H₄: Electronics and non-electronics industries significantly differ in input-output efficiency after implementing ERP systems.

METHODOLOGY

This study investigates how implementing ERP affects firm input-output efficiency by adopting a two-stage approach, data envelopment analysis (DEA) and Tobit regression. The first stage estimates input-output efficiency by using DEA methods, while the second stage investigates input-output efficiency factors by using a Tobit regression model.

Assessment of input-output efficiency based on DEA

Non-parametric approaches such as DEA, relative to parametric techniques, e.g., stochastic frontier analysis, are characterized by the fact that DEA analysis does not have to assume a particular functional form. Charnes et al. (1978) assumed constant returns to scale when estimating technical efficiency (TE) with the basic DEA method. Most studies select the conventionally adopted DEA method, without considering the exogenous factors to evaluate the input-output efficiency (e.g., Sufian and Habibullah, 2009; Lin et al., 2010). However, our sample firms implemented ERP in different years, explaining why input-output efficiency is likely to vary according to macroeconomic conditions. Importantly, macroeconomic factors must be controlled when estimating the input-output efficiency. In contrast with conventional DEA methods, this study adopts the Banker and Morey (1986) model, which includes the exogenous variable, gross domestic product (GDP) values, to consider this uncontrollable macroeconomic prosperity factor. The inputs are divided into two parts, controllable inputs, that is, labor, capital and raw materials and exogenous inputs (GDP). The DEA model in this study can be formulated as a fractional linear programming problem as Equation (1).

$$\begin{aligned}
 TE_j &= \text{Min} [\theta - \varepsilon(s_c^+ + s_F^+ + s^-)], \\
 \text{s.t. } \sum_{j=1}^n \lambda_j X_{i,Cj} + s_c^+ &= \theta X_{CA}, \quad i = 1, 2, 3, \\
 \sum_{j=1}^n \lambda_j X_{Fj} + s_F^+ &= \theta X_{FA}, \\
 \sum_{j=1}^n \lambda_j Y_j - s^- &= Y_A, \\
 \lambda_j, s_c^+, s_F^+, s^- &\geq 0, \quad j = 1, \dots, n,
 \end{aligned} \tag{1}$$

where TE_j denotes TE. θ denotes the maximum proportion of input levels that can be used to procure current output levels for the j th DMU; Y_j is the output for the j th DMU and $X_{i,cj}$ refers to the i th controllable inputs, that is, labor, capital and raw materials for the j th DMU; The number of employees, fixed assets, and raw materials are taken as labor, capital and raw material factors. Net sales revenue and pre-tax incomes are taken as output variables¹; the two input-output efficiency scores can thus be estimated separately. Moreover, X_{Fj} denotes the j th exogenous input (GDP) for the j th

DMU; λ_j represents the weight of the j th DMU; and S_c^+ , S_F^+ , and S^- are the controllable input surplus, the exogenous input surplus, and the output slacks, respectively.

The CRS assumption is only appropriate when all (DMUs) operate on an optimal scale. Imperfect competition, constraints on factors such as finance may prevent DMU from operating at the optimal scale. Previous research suggested extending the CRS DEA model to account for variable returns to scale (VRS) situation (Banker et al., 1984). Use of the CRS specification, when not all DMUs operate on the optimal scale, results in measures of TE biased by scale efficiencies (SE). Use of the VRS specification prevents such an inaccuracy. The CRS linear programming problem can be easily modified to account for VRS by adding the convexity

constraint $\sum_{j=1}^n \lambda_j = 1$ in Equation (2):

$$\begin{aligned}
 PTE_j &= \text{Min} [\theta - \varepsilon(s_c^+ + s_F^+ + s^-)], \\
 \text{s.t. } \sum_{j=1}^n \lambda_j X_{i,Cj} + s_c^+ &= \theta X_{CA}, \\
 \sum_{j=1}^n \lambda_j X_{Fj} + s_F^+ &= \theta X_{FA}, \\
 \sum_{j=1}^n \lambda_j Y_j - s^- &= Y_A, \\
 \sum_{j=1}^n \lambda_j &= 1, \\
 \lambda_j, s_c^+, s_F^+, s^- &\geq 0, \quad j = 1, \dots, n,
 \end{aligned} \tag{2}$$

where PTE_j is pure technical efficiency (PTE). The CRS TE measure is decomposed into PTE and SE as the following equation.

$$TE_j = PTE_j * SE_j. \tag{3}$$

Scale efficiency is related to the scale of productive facilities. A situation in which the average output of a firm, that is, output per unit input, increases as its input does implies an increasing returns to scale and an improved scale efficiency. However, a situation in which the average output of a firm decreases with an increasing input implies a decreasing returns to scale. Notably, returns to scale remain the same if the average output remains the same with an increasing number of inputs.

Based on the Mann-Whitney U test, this study verifies whether TE, PTE, and SE significantly differ in results before and after implementing ERP systems. The Mann-Whitney U test is a nonparametric statistical method used to verify the efficiency scores of a pair of different observations. Whether TE, PTE, and SE significantly differ after ERP implementation in the sample firms are examined here using statistical methods to validate H_1 .

Input-output efficiency determinants using Tobit regressions

This study attempts to identify factors that increase the efficiency of the input-output under ERP systems by applying Tobit regression to

¹ Given that pre-tax incomes are equivalent to net sales minus expenses, net sales and pre-tax incomes are the same output indicator of a firm in terms of profitability. Despite the ability of DEA to evaluate various outputs, net sales and pre-tax incomes should not be treated as multiple outputs. This work evaluates the two efficiency types by applying revenues and pre-tax net incomes as a single output separately.

regress TE, PTE and SE on not only financial turnover factors but also non-financial features as follows:

$$\text{Input-output Efficiency} = f(\text{ARD}, \text{ITD}, \text{APD}, \text{Vendor}, \text{ELE}) \quad (4)$$

where TE, SE, and PTE are selected as the input-output efficiency indicators. Notably, *ARD*, *ITD*, and *APD* denote accounts receivable turnover days, inventory turnover days and accounts payable turnover days.

This study examines the significance of the coefficients for these three turnover indicators to validate H_{2a} , H_{2b} and H_{2c} . Additionally, *Vendor* is a dummy variable. 44 and 39% of Taiwanese firms chose SAP and Oracle² as ERP package providers from 1998 to 2003. Rather than selecting overseas vendors, the other Taiwanese firms selected local vendors to either implement ERP formula or install ERP by themselves. By using the dummy variable, this study also examines whether ERP firms operating under SAP and Oracle have a superior operation input-output efficiency than that of other vendors, as proposed by H_3 . Moreover, *ELE* is another dummy variable.

Notably, variable *ELE* is equal to 1 if the sample firms belong to the electronics industry; otherwise, *ELE* equals 0. This study also applies the electronics industry dummy variable to determine the input-output efficiency difference between electronics and non-electronics industries in order to test H_4 .

Data and samples

This study focuses on Taiwanese listed firms that implemented ERP systems from 1998 to 2003. Data from the Financial Supervisory Commission, Taiwan Stock Exchange Market Observation Post System, Central News Agency Clippings System, *Taiwan Economic Journal (TEJ)* database were used, as well as Google searches under the keywords "ERP" or "enterprise resource planning" to identify firms that implement an ERP system. Fifty nine firms were drawn from the above sources as the sample firms in this study.

This study sets ERP implementation years of the 59 sample firms to 0. Negative numbers represent years before ERP implementation, and positive numbers represent years after implementation.

The sample firms implement ERP system in different years from 1998 to 2003, so the collected data of inputs factors, output factors and financial turnover days ranges from 1996 to 2005. Consequently, firms that implemented ERP systems after 2000 lack complete data from year 3 to year 6. Four hundred and seventy firm-year observations are collected in this study. The data of input factor, output factors and financial ratios are collected from Taiwan Economic Journal (*TEJ*) Database.

RESULTS

Comparison of pre-ERP and post-ERP implementation periods in terms of input-output efficiency

Figure 2 illustrates the input-output efficiency (TE, PTE

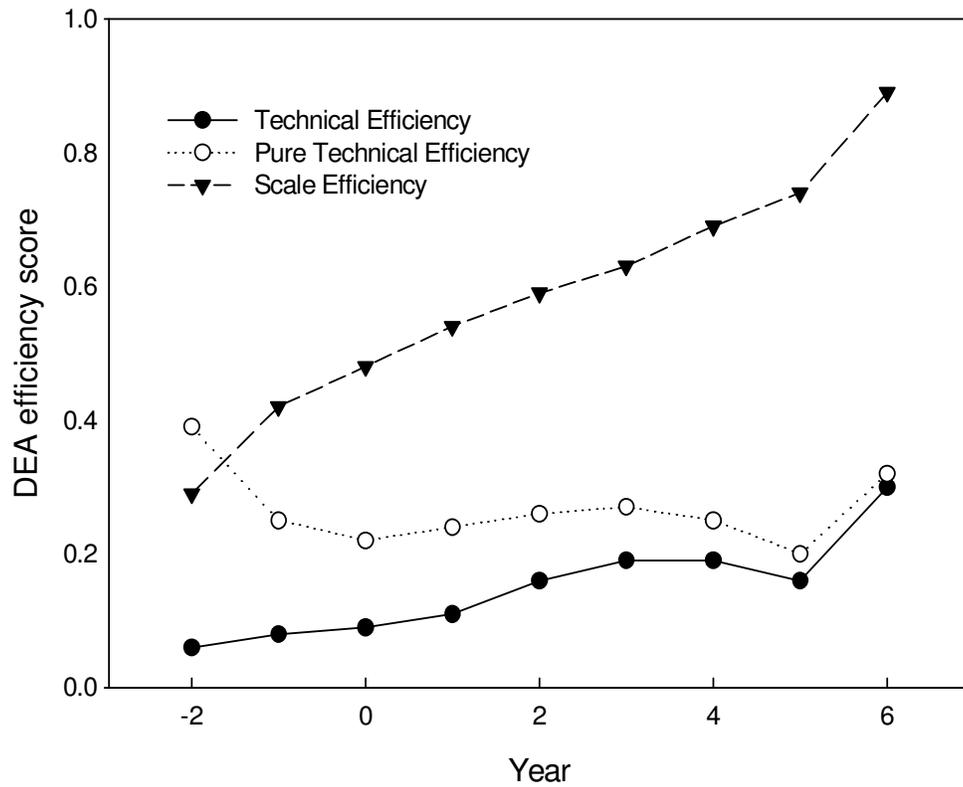
and SE) pattern of all sample firms before and after implementing ERP to estimate input-output efficiency by using both net sales revenue and pre-tax income as the output variables. Figure 2 reveals that TE increases slowly. Moreover, closely examining ERP firms reveals significant advances in SE after implementing ERP. In contrast, PTE continuously declines after implementing ERP, and PTE does not increase until the fifth year after implementing ERP. This may be owing to that the ERP system has interrupted the current balance of the firm. Staff and employees must spend time learning or adapting themselves to ERP systems, subsequently causing a temporary confusion of work divisions and decreasing the input-output efficiency during the initial phase of ERP implementation. This finding corresponds to Ross (1999) in which 15 firms in the production industry was investigated. According to that study, once a firm has invested in ERP systems, the input-output efficiency declines temporarily. Only after two to five years of implementing ERP, visible signs appear of an increased input-output efficiency (Davenport, 2000).

This study further separates the sample firms into electronics firms and non-electronics firms, allowing them to act as two mutually exclusive groups. By doing so, their annual average input-output efficiency trends are illustrated graphically, as shown in Figures 3 and 4, respectively. For electronics firms, the three input-output efficiency patterns are generally the same as that of the full sample firms. According to Figures 3 and 4, TE and SE efficiency improve after ERP implementation, while PTE significantly rebounds only after the sixth year subsequent to ERP implementation. Our results further indicate that the PTE of non-electronics firms is even better before ERP implementation, while that of electronics firms is not. This may be owing to that firms in the electronics industry are much more familiar with information technology (IT) systems than firms in the non-electronics industry. Staff and employees in the electronics industry adapt to the ERP system, which is an IT system, more effectively those in the non-electronics industry. In contrast with the electronics industry, non-electronics firms are more familiar with human interface; in addition, a sudden shift to ERP formula under IT systems may incur substantial confusion. Hence, non-electronics firms are in a more disadvantageous position when attempting to improve PTE through ERP implementation.

Moreover, this study attempts to demonstrate that the pre-ERP and post-ERP stages differ in input-output efficiency by using the Mann-Whitney U test in order to verify the findings. Table 2 summarizes the results of Mann-Whitney U test. The input-output efficiency is also estimated by using pre-tax income as the output variable. According to those results, TE or SE is significantly higher after ERP implementation. Consistent with H_1 , the Z statistics under U test also confirm that TE or SE prior to ERP implementation significantly differs from that subsequent to ERP implementation at a significance level

²Five leading ERP vendors are SAP, PeopleSoft, Baan, Oracle, and J. D. Edwards (Edmondson and Baker 1997, AMR Research 1999). However, Taiwanese sample firms only select SAP and Oracle vendors, explaining why the vendor variable is coded as one for firms selecting leading vendors, SAP and Oracle.

(a) Net sale revenue



(b) Pre-tax income

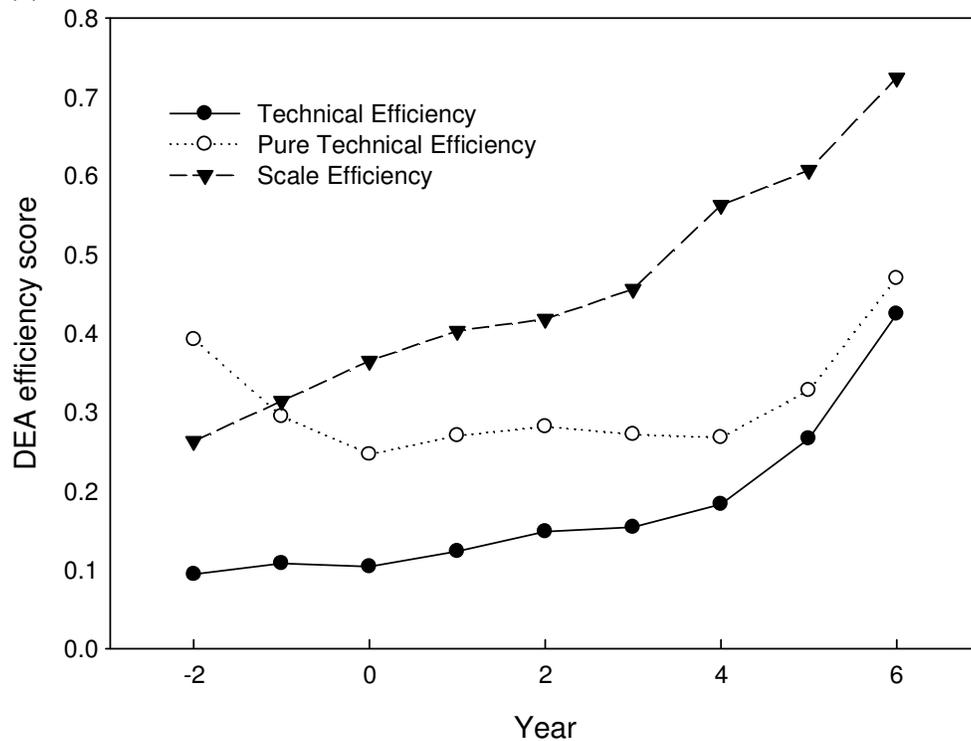
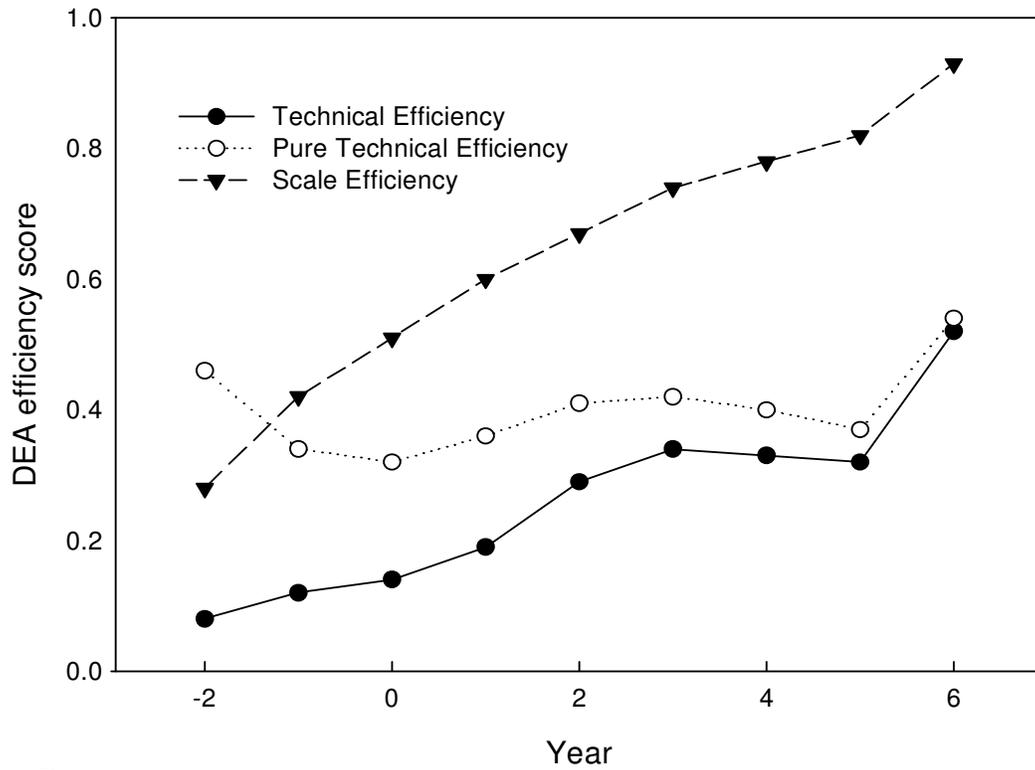


Figure 2. Input-output efficiency of full sample firms before and after ERP implementation. The ERP implementation years are set year 0. Negative years represent years prior to the ERP implementation year and positive years represent years subsequent to the ERP implementation year. Besides, the DEA efficiency scores are evaluated by using (a) net sale revenue and (b) pre-tax income as the output indicators, respectively.

(a) Net sale revenue



(b) Pre-tax income

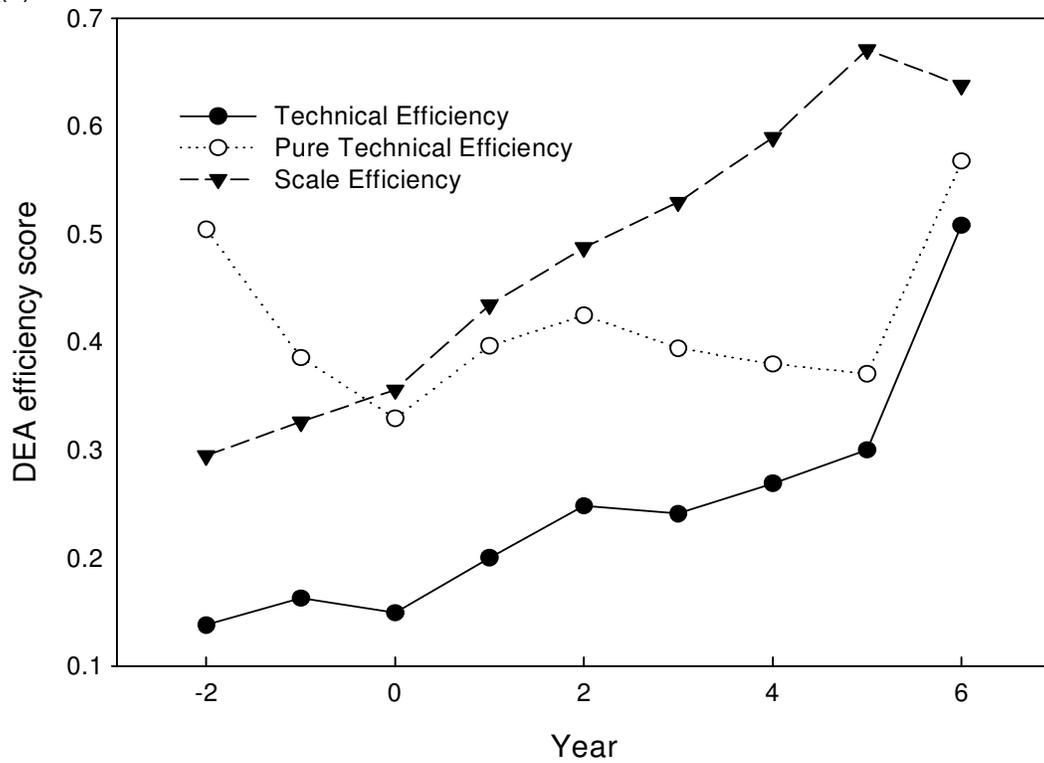


Figure 3. Input-output efficiency of the electronics industry before and after ERP implementation. The ERP implementation years are set year 0. Negative years represent years prior to the ERP implementation year and positive years represent years subsequent to the ERP implementation year. Besides, the DEA efficiency scores are evaluated by using (a) net sale revenue and (b) pre-tax income as the output indicators, respectively.

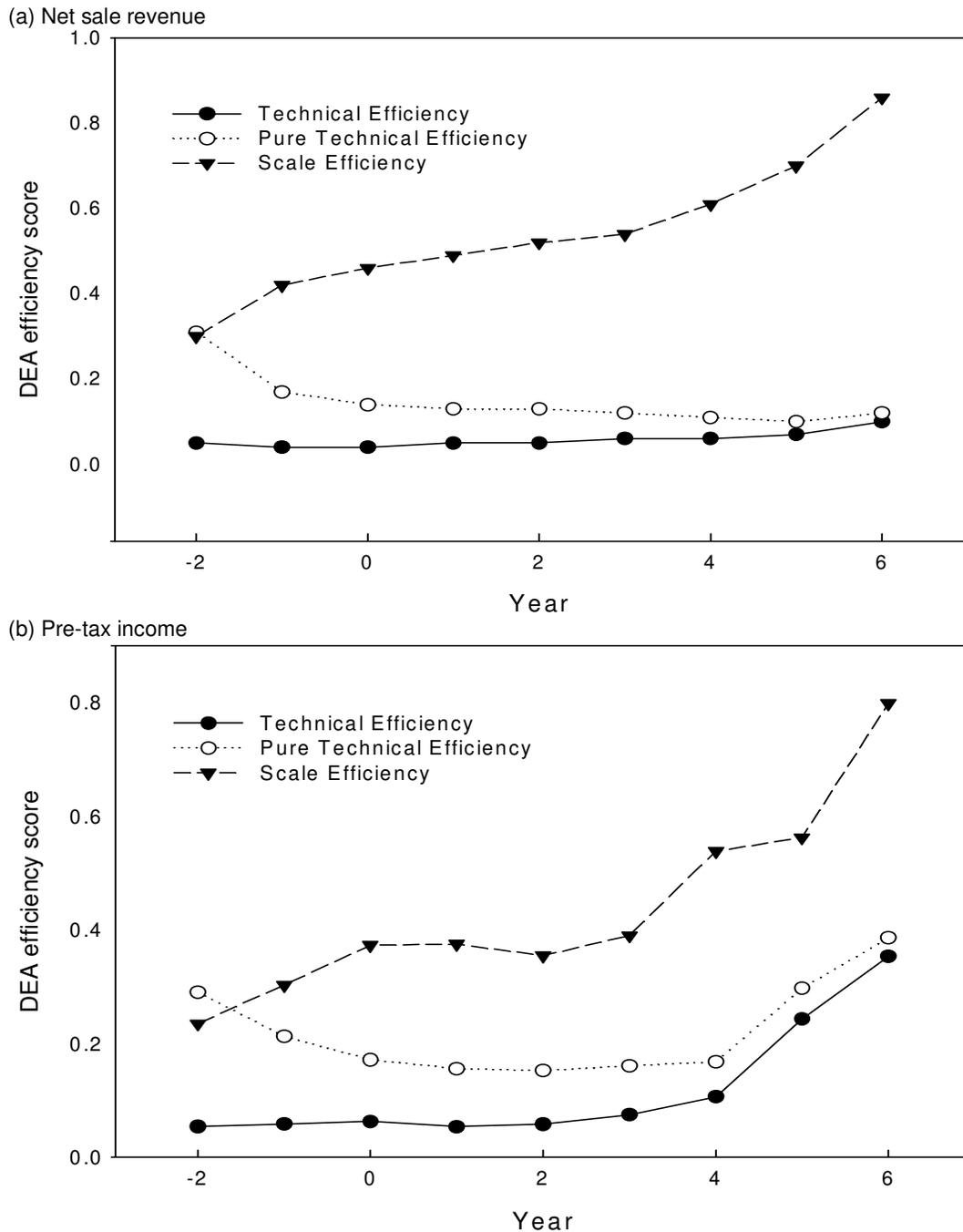


Figure 4. Input-output efficiency of the non-electronics industry before and after ERP implementation. The ERP implementation years are set year 0. Negative years represent years prior to the ERP implementation year and positive years represent years subsequent to the ERP implementation year. Besides, the DEA efficiency scores are evaluated by using (a) net sale revenue and (b) pre-tax income as the output indicators, respectively.

of 1%. Moreover, the input-output efficiency is estimated using both net sale revenue and pre-tax income as the output variables. According to those results, SE obviously increases with ERP implementation. The phenomenon is possibly attributed to the support of ERP technology,

through which, firms can develop the optimal scale, subsequently optimizing their resource allocation. Besides, integrating the various divisions in a factory, ERP systems can expand the production scale without additional costs, thus increasing corporate competitiveness.

Table 2. Difference in input-output efficiency between pre-ERP and post-ERP implementation.

Output indicator:	Technical efficiency	Pure technical efficiency	Scale efficiency
Net sale revenue			
Full sample	0.0976	-0.0325	0.2563
Z-statistics	4.6102***	-2.3035**	8.5528***
Electronics	0.1954	0.0350	0.3246
Z-statistics	5.1649***	0.2215	7.4371***
Non-Electronics	0.0159	-0.0859	0.1982
Z-statistics	2.4788***	-2.9847***	4.9109***
Pre-tax income			
Full sample	0.0753	-0.0542	0.1894
Z-statistics	1.0090	-2.4962***	4.0754***
Electronics	0.1031	-0.0267	0.1935
Z-statistics	0.8945	-1.0688	2.7289***
Non-Electronics	0.0532	-0.0745	0.1870
Z-statistics	0.7410	-2.1258**	3.1397***

Firms can adjust the number of finished goods based on the inventory of raw materials, ultimately allow them to elevate SE and raise TE.

As aforementioned, TE subsequent to ERP implementation is significantly superior to TE prior to ERP implementation as we estimate the input-output efficiency by using net sales revenue as the output variable. However, TE is not significantly higher for the input-output efficiency estimation using pre-tax income as the output variable. Notably, net sales revenue and pre-tax income as output indicators differ in terms of estimating TE efficiency owing to that an initial ERP installation typically requires around US \$15 million (O'Leary, 2000), and annual expenditures as high as 2 to 3% of the firm revenue (Escalle et al., 1999).

However, its benefits do not start to emerge until after an average of 31 months (O'Leary, 2000). Although ERP elevates the net sales revenue in the first year, the enormous amount of ERP installation expenditures simultaneously reduces the pre-tax income. Consequently, if the pre-tax income is used as the output proxy to determine the DEA input-output efficiency scores, the TE during the initial installation years does not obviously improve than that before ERP implementation.

Tobit regression analysis results

This section describes the determinants of input-output efficiency improvement during ERP implementation periods, ranging from year -2 (two years before ERP implementation) to year 6 (six years after ERP implementation). Table 3 summarizes the Tobit regression analysis results, with TE, PTE and SE as dependent variables, respectively. For the input-output efficiency estimation using both net sale revenue and pre-tax

income as the output variables, the TE is significantly associated with the turnover days of inventory, accounts receivable and accounts payable. Table 3 also reveals that the coefficients of accounts receivable turnover days are negative. According to t-statistical results, the coefficients of accounts receivable turnover days are statistically significant at the 1% level. Accounts receivable turnover days appear to negatively explain TE and SE. This finding suggests that during the ERP implementation years, fewer days that a firm spent on receiving their account from the credit sales led to a higher input-output efficiency. With the assistance of ERP systems, firms can integrate information from branch offices distributed over the globe to form a unified set of data, subsequently shortening the credit sale process. Consequently, accounts receivable turnover days decrease after ERP implementation (Figure 1). The input-output efficiency performs better after ERP implementation. Consistent with H_{2a} , the input-output efficiency improvements generated by ERP system should be attributed to the curtailment of accounts receivable turnover days.

The coefficients of inventory turnover days (Table 3) are all negative. According to t-statistical results, the coefficients of inventory turnover days are statistically significant at the 1% level. Input-output efficiency indicators appear to be significantly and negatively related to inventory turnover days. This finding suggests that during the ERP implementation years, fewer days that a firm spent on selling their finished goods inventory after the production process implies a higher input-output efficiency. We can thus infer that ERP systems facilitate the integration of data within several factories and allow raw materials or factory labor inputs to work at optimal levels via the standard inventory management. Firms operating under ERP systems effectively use their

Table 3. Results of input-output efficiency regressed on financial and non-financial factors.

Output indicator	TE		PTE		SE	
	Coefficient	T statistics	Coefficient	T statistics	Coefficient	T statistics
Revenue						
Accounts receivable turnover days	-0.1035	-3.5820***	-0.0778	-1.9782**	-0.2729	-6.1416***
Inventory turnover days	-0.1180	-5.0435***	-0.0992	-3.1237***	-0.2093	-5.8219***
Accounts payable turnover days	0.0927	2.4085**	0.0760	1.4517	0.0352	0.5950
Vendor	4.2517	2.3735**	-9.4302	-3.8754***	22.9976	8.3363***
ELE	13.1288	6.9755***	21.9419	8.5840***	-0.1226	-0.0424
Constant	16.7761	6.4078***	28.6319	8.0536***	78.4444	19.5276***
R ²	0.2802		0.2414		0.3420	
Adjusted R ²	0.2708		0.2315		0.3335	
Pre-tax income						
Accounts receivable turnover days	-0.1973	-4.3591***	-0.0883	-1.9791**	-0.3330	-5.1724***
Inventory turnover days	-0.2129	-6.1654***	-0.2075	-6.2780***	-0.2611	-5.3603***
Accounts payable turnover days	0.1729	2.9524***	0.1405	2.4029**	0.0718	0.8591
Vendor	-1.4040	-0.4562	-8.6972	-2.8328***	4.5669	1.0404
ELE	4.7800	1.4370	-3.7684	-1.1262	13.1255	2.7594***
Constant	27.5884	6.4583***	49.1809	11.5871***	63.4500	10.4390***
R ²	0.1485		0.1162		0.2236	
Adjusted R ²	0.1375		0.1047		0.2135	

*Significant at the 10% level, **Significant at the 5% level, ***Significant at the 1% level and the dependant variables include TE, PTE and SE (%).

resources, subsequently leading to a significant decline in their average inventory turnover days (Figure 1). Hence, the reduced inventory turnover contributes to the input-output efficiency after ERP implementation. Consistent with H_{2b}, the improved input-output efficiency generated by the ERP system is attributed to the reduction of inventory turnover days.

Table 3 reveals that TE is positively associated with the turnover days of accounts payable. A larger number of days of accounts payable imply a higher input-output efficiency. Since ERP systems enable both the economies of scale and the effective management of firms, firms adopting ERP systems are more likely to be permitted by their suppliers to prolong the period of unpaid account (Figure 1). Hence, the input-output efficiency improves due to a flexible cash flow once firms delay to pay for their procurements. Additionally, the findings concerning how operational progress of accounts payable management impacts firm input-output efficiency are consistent when either profit or revenue related variables are introduced as the output indicators to evaluate the DEA input-output efficiency.

As for non-financial characteristics, the coefficient of leading vendor variable is positive for TE and SE in the input-output efficiency estimation, as determined by using the net sale revenue as the output indicators. Firms adopting SAP or Oracle systems have a significantly higher input-output efficiency than the other firms after implementing ERP. Therefore, we can infer that such

rapid growth in input-output efficiency is attributed to the conjoined support from experienced consultant agents. The findings correspond to H₃.

Conversely, the coefficient of leading vendor variable is insignificant for TE and SE when estimating the input-output efficiency, in which pre-tax income is used as the output indicator. This observation is probably owing to the enormous consultant charges of the ERP leading vendors during the sample period, that is, from the commencement of ERP implementation to 2005. Pre-tax income equals total sales revenues minus total expenses for enterprises. Although ERP leading vendors elevate the net sale revenue to a greater extent than the other vendors do, the pre-tax income is simultaneously reduced by the larger amount of consultant charges paid to the leading vendors. Consequently, utilizing the pre-tax income as the output proxy makes it impossible to distinguish between firms using leading vendor packages and the firms using other vendor devices in terms of input-output efficiency.

Additionally, the coefficients of electronics industry dummies are significantly positive in Tobit regressions in which TE and PTE are employed as the dependent variables when net sale revenue is taken as the output indicator to estimate input-output efficiency. This finding is the same with SE when pre-tax income is taken as the output indicator. The electronics firms perform superior to non-electronics firms after ERP installation because employees and staff in the electronics industry are more

accustomed to such information technology than those in other industries. The findings of Tobit regressions correspond to the findings of Figures 3 and 4 as earlier mentioned.

Conclusions

Given the relatively little attention paid to the relationship between input-output efficiency advance of firms and the implementation of ERP systems, this study compares pre-ERP and post-ERP periods in terms of input-output efficiency by utilizing the modified data envelop analysis (DEA) of Banker and Morey's (1986), which incorporates exogenous inputs. Empirical results validate our hypotheses, indicating that firms adopting ERP perform superior to firms not adopting ERP across a wide variety of input-output efficiency measures. This finding suggests that ERP systems yield substantial benefits to the firms. Superior levels of functional integration are also apparent under ERP fittings. The turnover days of accounts receivable are reduced from 68 days (two years before ERP implementation) to 52 days (six years after ERP implementation). The turnover days of inventory decline from 70 days (two years before ERP implementation) to 48 days (six years after ERP implementation). Additionally, firms can prolong the turnover days of accounts payable from 45 days (ERP installation year) to 50 days (five years after ERP implementation).

This study further demonstrates that input-output efficiency of a firm is closely related to the turnover days of accounts receivable, inventory and accounts payable. This finding suggests that the functional integration under ERP fittings largely drives the input-output efficiency elevation. Interestingly, a greater progress in input-output efficiency can be made with leading vendor packages (SAP and Oracle) than other vendor packages. Moreover, the boost in input-output efficiency is greater with electronics firms than with non-electronics ones. Above results demonstrate how non-financial factors, differences in industries and proficiency differences of vendors can impact the input-output efficiency of a firm after ERP implementation. Since ERP systems facilitate the integration of overall business operations, e.g., production, sales, human resources, research and development along with finances, such systems coordinate effective management in the electronics industry.

Despite its obvious contributions, this study has certain limitations. This study only monitors the performance of firms for six years after ERP implementation due to a lack of long-term post-implementation data. Future research should analyze in detail how ERP impacts productivity in the long term.

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Full Length Research Paper

Money demand function with asymmetric adjustment: Evidence on Brazil, Russia, India, and China (BRICs)

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The long-run equilibrium relationship for the money demand function in the BRICs is investigated by the asymmetrical TAR and M-TAR cointegration tests developed by Enders and Granger (1998), Enders and Siklos (2001). Empirical results indicate that real M2 money balance, real GDP, real exchange rate and deposit rate have a long term relationship under some specific threshold value. Furthermore, we apply asymmetrical error-correction models to test if the money demand of the BRICs exist any nonlinear forms which will be compared with symmetrical error-correction models. Therefore, we find that M2 money demand in the BRICs support the hypothesis of an asymmetrical error correction process and provide better interpretation of macroeconomic meanings in the demand for money.

Key words: Money demand function, threshold autoregressive model, asymmetry adjustment, BRICs.

INTRODUCTION

A stable money demand function may be considered very important for conducting monetary policy, thus the money demand function has long been a cornerstone in macro-economic modeling. Academic researchers continue to search for a specification of the money demand function that gives a reliable long-run equilibrium relationship with other macroeconomic variables. Econometric estimates of money demand function abound in the developed and developing countries and most studies of the demand for money focus on developed countries. By comparison, emerging economies in general and transition economies in particular have received less attention in the literature. In this study, taking a fresh look at this function of the BRICs that includes China, India, Brazil, and Russia. Goldman Sachs (Wilson and Purushothaman, 2003) argue that the BRICs economies could become a much larger force in the world economy over the next 50 years, and predicts China and India, respectively, to be the dominant global suppliers of manufactured goods and

services while Brazil and Russia would become similarly dominant as suppliers of raw materials. By 2025 they could account for over half the size of the G6. Thus, the BRICs have the potential to form a powerful economic bloc to the exclusion of the modern-day G6 status. These countries are forecast to encompass over 40% of the world's population and hold a combined GDP of 14.051 trillion. On almost every scale, they would be the largest entity on the global stage. Rao and Singh (2006) estimate the demand for narrow money in India and evaluate its robustness, thus they find that there is a stable demand for money for almost half a century. Deng and Liu (1999) use the cointegration and error-correction model to formulate the function of money demand and merge the short-run and long-run equations to give forecasts over different horizons in China. Austin, Ward, and Dalziel (2007) investigate nonlinearities in the demand for money in China that would suggest a threshold point for inflation materially entering into the decisions of Chinese households and firms. Bahmani-Oskooee and Barry (2000) find that the demand for money in Russia which includes income, inflation rate and exchange rate variables were unstable in the 1990s. Harrison and Vymyatnina (2005) test the stability of long-run and short-run demand for money in Russia using M1 and M2 money aggregates and find some evidence of stability, but the adjustment

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lag is relatively long and money demand functions demonstrate signs of instability over the period.

The literature on money demand function estimation is long-standing and extensive. Most of these literatures are concerned with the existence of a stable money demand function. Notable references are Friedman and Schwartz (1991), McNown and Wallace (1992), Stock and Watson (1993), Ball (2001), and Anderson and Rasche (2001). Friedman and Schwartz (1991) have argued that the underlying characteristics of the money demand function rarely change over a long period of time. In the long run, the money demand function depends mainly on macroeconomic variables, such as interest rate, real income, and, in an open economy, exchange rates, may be cointegrated and have a stable long-run equilibrium relation. One way of examining the long-run equilibrium relationship of a money demand function is to test for a cointegration relationship. If a linear combination of non-stationary variables including real money balances, real income, and interest rates is stationary, the variables have a long-run equilibrium relationship. Using cointegration approaches, many studies have investigated the long-run equilibrium relationship of money demand functions. For example, Hafer and Jansen (1991), Baba et al. (1992), MacDonald and Taylor (1992), and Arize (1994), who investigated the stability of the US money demand function, used methods proposed by Engle and Granger (1987) and Johansen (1988), whose approaches assume that the adjustment process toward equilibrium is symmetric. In contrast, Friedman and Kuttner (1992) and Miyao (1996), employing these standard approaches, found the instability of the United State money demand function.

However, most of the research addressing the issue of equilibrium has not taken into account the asymmetric properties of the adjustment process in money demand. Asymmetry has been an important property in recent macroeconomic analysis, with a large number of studies providing evidence of the asymmetric adjustment of macroeconomic variables. Muscatelli and Spinelli (1996) and Ericsson et al. (1998) include a cubic error-correction term as a regressor in their study of the money demand function in Italy and in the United Kingdom, respectively. They find that the nonlinear error-correction specification better describes the short-run dynamics and improves the overall goodness-of-fit. For instance, the variations in money are more volatile in an economic downturn than in an upswing. Therefore, it is necessary to analyze the long-run equilibrium relationship in money demand by a cointegration test assuming asymmetric adjustment.

Threshold cointegration methods are being increasingly employed to analyze economic and financial data, and are especially useful in the study of time series which are characterized by asymmetric adjustment. The aim of this study is to examine whether the BRICs money demand functions have asymmetric adjustment toward equilibrium using threshold autoregressive (TAR, Enders and Granger, 1998) and momentum-threshold autoregressive

(M-TAR, Enders and Granger, 1998; Enders and Siklos, 2001) models. The TAR and M-TAR models were formerly developed by Tong (1983), and these asymmetric error-correction models extend the original cointegration tests in the presence of asymmetric adjustment. As a recent studies employing nonlinear adjustment, Maki and Kitasaka (2006) investigate the long-run equilibrium relationship among money, income, prices, and interest rates in Japan by the threshold cointegration test, which allows for asymmetric adjustment, introduced by Enders and Siklos (2001). In the present paper, the threshold cointegration test introduced by Enders and Siklos (2001) is used, who expanded the Engle and Granger (1987) test into allowing for asymmetric adjustment toward equilibrium. Their proposed TAR model allows the degree of autoregressive decay to depend on the state of the variables.

Most models of the past empirical research addressing the issue of equilibrium have not taken into account the asymmetric properties of the adjustment process in money demand. Since Enders and Granger (1998) and Enders and Siklos (2001) proposed the asymmetrical TAR and M-TAR cointegration tests, discussing macroeconomic variables by applying nonlinear models are going to be the mainstream. Moreover, most developing countries of the demand for money have received less attention and separately investigated each country of the BRICs. Thus, this present empirical study contributes significantly to this field of research because, firstly, it determines whether stable money demand functions exist in the BRICs for which we use TAR and M-TAR cointegration tests. Second, this study is the first attempt to examine whether the BRICs money demand functions have asymmetric adjustment toward equilibrium. Third, we apply asymmetrical error-correction models to describe the money demand of the BRICs and the function could be served as the guideline for macro policy. To the best of our knowledge, our paper is the first attempt to investigate nonlinearity in the long-run cointegration relationship of the money demand function for BRICs.

METHODOLOGY

We specifically employ the threshold cointegration approach elaborated by Enders and Granger (1998), Enders and Siklos (2001). This is indeed a residual-based two-staged estimation as developed by Engle and Granger (1987). As an assumption of the

tests for threshold cointegration, consider M2 series, denoted as y_t , and a set of n macroeconomic variables, $X_t = (x_{1t}, x_{2t}, \dots, x_{nt})'$, however, in this study macroeconomic variables are real GDP, real exchange rates, interest rates.

Suppose both y_t and x_t are $I(1)$ series, and are linearly cointegrated with only one cointegrated relation, the long-run equilibrium relationship is given by:

$$y_t = \beta_0 + \beta_1 x_{1t} + \beta_2 x_{2t} + \dots + \beta_n x_{nt} + \mu_t \quad (1)$$

where β_0 is a constant, β_0, \dots, β_n are estimated parameters and μ_t is the disturbance term that may be serially correlated. The existence of the long-run equilibrium relationship involves the stationarity of μ_t . To investigate the stationarity of μ_t , whether $-2 < \rho < 0$ has to be tested for in the second step procedure given by:

$$\Delta\mu_t = \rho\mu_{t-1} + \varepsilon_t \quad (2)$$

where ε_t is a white-noise disturbance and the residuals from the regression model are used to estimate $\Delta\mu_t$. Rejection the null hypothesis of no cointegration (that is, accepting the alternative hypothesis $-2 < \rho < 0$) implies that the residuals in Equation 2 are stationary with mean zero. Hence, the long-run equilibrium relationship (Equation 1) with symmetric adjustment (Equation 2) is accepted.

The standard cointegration framework assuming symmetric adjustment toward equilibrium in Equation 2 is misspecified if the adjustment process is asymmetric. A formal way to introduce asymmetric adjustment is to let the deviation from the long-run equilibrium in Equation 1 behave as a TAR process. Enders and Siklos (2001) proposed test of threshold cointegration such that the residuals from Equation 1 are estimated in the form

$$\Delta\mu_t = I_t\rho_1\mu_{t-1} + (1-I_t)\rho_2\mu_{t-1} + \varepsilon_t \quad (3)$$

where I_t is the Heaviside indicator such that

$$I_t = \begin{cases} 1 & \text{if } \mu_{t-1} \geq \tau \\ 0 & \text{if } \mu_{t-1} < \tau \end{cases} \quad (4)$$

and τ is the threshold value. If $\mu_{t-1} \geq \tau$, the value of $I_t = 1$, and the speed of adjustment in Equation 3 is ρ_1 . Instead, if $\mu_{t-1} < \tau$, $I_t = 0$, the speed of adjustment is ρ_2 . A necessary and sufficient condition for $\{\mu_t\}$ to be stationary is $-2 < (\rho_1, \rho_2) < 0$. The threshold parameter τ , which is restricted to the ranges of the remaining 70% of μ_t when the largest and smallest 15% values are discarded, is selected as an unknown value so as to minimize the sum of the squared residuals obtained from Equation 3 (Chan, 1993 for details). Enders and Granger (1998) also indicated that if the $\{\mu_t\}$ sequence is stationary, the least squares estimates of ρ_1 and ρ_2 have an asymptotic multivariate normal distribution if the value of the threshold is known (or consistently estimated). When the adjustment process (Equation 3) is serially correlated, Equation 3 is re-written as:

$$\Delta\mu_t = I_t\rho_1\mu_{t-1} + (1-I_t)\rho_2\mu_{t-1} + \sum_{i=1}^p \gamma_i\Delta\mu_{t-i} + \varepsilon_t \quad (5)$$

although it is possible that γ_i is asymmetric, for the sake of simplicity, this case is not considered, as in Enders and Siklos (2001).

Instead of estimating Equation 3 with the Heaviside indicator depending on the level of μ_{t-1} , the decay could also be allowed depending on the previous period's change in μ_{t-1} . In this case, the Heaviside indicator of Equation 4 becomes:

$$I_t = \begin{cases} 1 & \text{if } \Delta\mu_{t-1} \geq \tau \\ 0 & \text{if } \Delta\mu_{t-1} < \tau \end{cases} \quad (6)$$

where τ is the threshold value. The Heaviside indicator could then be specified as $I_t = 1$ if $\Delta\mu_{t-1} \geq \tau$ and $I_t = 0$ if $\Delta\mu_{t-1} < \tau$. According to Enders and Granger (1998), this model is especially valuable when adjustment is asymmetric such that the series exhibits more "momentum" in one direction than the other. This model is termed M-TAR model. The TAR model is designed to capture asymmetrically "deep" movements in the series of the deviations from the long-run equilibrium, for example, if positive deviations are more prolonged than negative deviations. On the other hand, the M-TAR model is useful to capture the possibility of asymmetrically "steep" movements in the series. In the TAR model if $-1 < \rho_1 < \rho_2 < 0$, then the negative phase of μ_t will tend to be more persistent than the positive phase. For the M-TAR model, if for example $|\rho_1| < |\rho_2|$ the model exhibits little decay for positive $\Delta\mu_{t-1}$ but substantial decay for negative $\Delta\mu_{t-1}$. This means that increases tend to persist but decreases tend to revert quickly toward the attractor.

Finally, we can perform a number of statistical tests on the estimated coefficients in order to ascertain whether the variables are cointegrated and, in such a case, if the adjustment is symmetric or not. Enders and Siklos (2001) proposed two tests, called the Φ and t -max statistics. The Φ statistic using the F -statistic involves procedure testing for the null hypothesis $\rho_1 = \rho_2 = 0$, and t -max statistic using a t -statistic requires the test for the null hypothesis with the largest $\rho_i = 0$ between ρ_1 and ρ_2 . If the null hypothesis with no cointegration is rejected, the null hypothesis

$\rho_1 = \rho_2$ can be tested for with a standard F -statistic because the system is stationary. The equilibrium relationship with symmetric adjustment is accepted when the null hypothesis with no cointegration is rejected and the null hypothesis $\rho_1 = \rho_2$ is not rejected. In this case, the Engle-Granger (E-G) test for cointegration is a special case of Equation 3.

RESULTS

The data used in this study consist of quarterly observations on the natural logarithm of the real M2 money balance (lnM2), the natural logarithm of real gross domestic product (lnGDP), the natural logarithm of three months time deposit rate (lnTD), and the natural logarithm of the real exchange rate (lnEX) from the 1994 to 2008. Real money balance is obtained by deflating M2 by the consumer price index, and real gross domestic product is also obtained by deflating GDP by the consumer price index.

Table 1. The results of nonlinear unit root test - KSS test.

<i>t</i> -Statistic (Level)	lnM2 ²	lnGDP ³	lnEX ⁴	lnTD ⁵
China	-1.5865	1.9267	-2.5058	-2.6120
India	1.0177	0.7954	-2.0416	-1.0414
Brazil	-0.5040	-0.9653	-1.7703	-2.5459
Russia	2.0123	-0.3323	-1.4626	-1.9801

1. The 0.01, 0.05, 0.1 asymptotic null critical values for KSS tests are -3.48, -2.93 and -2.66, respectively (Kapetanios et al., 2003).

2. lnM2 denotes the natural logarithm of the real M2 money balance.

3. lnGDP denotes the natural logarithm of real gross domestic product.

4. lnEX denotes the natural logarithm of the real exchange rate.

5. lnTD denotes the natural logarithm of three months time deposit rate.

The data were collected from the International Financial Statistics (IFS), AREMOS, and DATASTREAM databases.

Nonlinear unit root test

Recently, there is a growing consensus that macroeconomic variables might exhibit nonlinearities, and that conventional tests for stationarity, such as the ADF unit root test, have lower power in detecting the mean reverting (stationary) tendency of the series. For this reason, stationarity tests in a nonlinear framework must be applied.

This study employs the nonlinear stationary test advanced by Kapetanios, Shin, and Snell (2003, henceforth denoted as KSS test) to determine if the real M2 money balance (lnM2), real income (lnGDP), real exchange rate (lnEX), and deposit rate (lnTD) for the BRICs are nonlinear stationary. Table 1 presents the results of KSS (2003) nonlinear stationary test, which shows that all variables considered in this study are integrated of order one series, $I(1)$, at least at the 10% significant level.

The results indicate that the null of a unit root is not rejected against the nonlinear stationary alternatives for all variables.

Threshold cointegration tests

We found nonlinear relationship exist real M2 money balance (lnM2), real GDP (lnGDP), real exchange rate (lnEX), and deposit rate (lnTD) when we use KSS unit root test. Therefore, we go for threshold cointegration tests, Equation 1 was estimated using ordinary least squares (OLS) and saved the residuals in the sequence $\{\mu_t\}$.

For each type of asymmetry, we set the indicator function I_t according to Equation 4 or Equation 6 and estimated an equation in the form of Equation 5. The Akaike Information Criterion (AIC) and Schwartz Bayesian Information Criterion (SBC) were used to select the most appropriate lag length and to determine whether

the adjustment mechanism is best captured as a TAR or M-TAR process. The results of the threshold cointegration test with zero and consistent estimate of the threshold are reported in Table 2.

For comparison purposes, the first rows of Table 2 present the E-G's cointegration test results. When we conduct the traditional linear E-G cointegration test, the null hypothesis can be rejected. In other words, there is one cointegration among all variables for each country. Notice that the AIC and SBC select the asymmetric models over the linear adjustment models for all countries, moreover, diagnostic checking of the residuals of the E-G's models show evidence of serial correlation. Thus, TAR and M-TAR models are more appropriate than the E-G's models. We also find that the consistent estimate of the threshold of TAR and M-TAR models with the AIC and SBC as the selection standards are superior to the TAR and M-TAR models with the threshold value of zero. As shown in Table 2, In the China case, based on AIC and SBC, the TAR model with the consistent estimate of the threshold is selected and the null hypothesis of $\rho_1 = \rho_2 = 0$ can be reject at the 10% significance level, whereas, the M-TAR model with the consistent estimate of the threshold are selected and the null hypotheses of $\rho_1 = \rho_2 = 0$ can be reject at the 1% significance level for India, Brazil, and Russia.

However, there is no reason to presume that the threshold is identically equal to zero. The consistent threshold estimates of 0.1365, 0.0481, 0.0497, and -0.2876 are obtained for China, India, Brazil, and Russia, respectively. We fail assuming linear adjustment or allowing for asymmetric adjustment using a threshold value of zero for the BRICs and find that there is a strong evidence of long-run money demand function for the BRICs. In addition, we test for symmetric versus asymmetric adjustment using the standard *F*-statistic. For India, Brazil, and Russia, the null hypothesis of symmetric adjustment is rejected at the 1% significance level. Besides, there is evidence that $|\rho_1| > |\rho_2|$ implying that the speed of adjustment is more rapid for positive than for negative discrepancies. For example, the real rate of the China

Table 2. The results of cointegration tests.

Country	Model	lags	τ	ρ_1	ρ_2	AIC/SBC ¹	$\rho_1 = \rho_2 = 0^2$	$\rho_1 = \rho_2^3$	Q(4) ⁴	Flag
China	E-G	5		-0.1954** (-2.1657)		-65.2967/ -52.9683			98.0810 [0.0000]	TAR
	TAR	5	0	-0.3517*** (-2.9859) ⁵	-0.1370 (-1.0778) ⁶	-67.7576/ -55.2683	4.6689	1.7955	2.3551 [0.6708]	
			0.1365	-0.4147*** (-3.4123)	-0.1152 (-1.0081)	-70.0635/ -57.5742	5.9155*	3.8829	3.2969 [0.5094]	
	M-TAR	5	0	-0.2636** (-2.3240)	-0.2382* (-1.7194)	-65.7013/ -53.2120	3.6111	0.0242	2.2900 [0.6826]	
			-0.0846	-0.2518*** (-2.7280)	-0.8659* (-1.9189)	-67.8981/ -55.4088	4.7431	1.9197	2.4082 [0.6611]	
	E-G	2		-1.1309*** (-5.1388)		-94.9431/ -87.6285			10.1050 [0.0390]	M-TAR
India	TAR	2	0	-0.9589*** (-3.5889)	-1.2373*** (-5.3158)	-98.1988/ -90.7982	14.4461***	1.3565	7.5147 [0.1111]	
			-0.0419	-0.9380*** (-3.7983)	-1.3299*** (-5.4647)	-99.5907/ -92.1901	15.5266***	2.6898	8.6851 [0.0695]	
	M-TAR	2	0	-0.9883*** (-3.8613)	-1.2622*** (-5.1908)	-98.0996/ -90.6990	14.3703***	1.2629	7.5985 [0.1074]	
			0.0481	0.0694 (-0.1827)	-1.0190*** (-5.2228)	-109.6553/ -102.2547	24.3684***	13.6004***	5.7468 [0.2189]	
Brazil	E-G	1		-0.4286** (-2.5639)		-98.7379/ -94.9955			8.7616 [0.0670]	M-TAR
	TAR	1	0	-0.5844*** (-2.9256)	-0.2355 (-1.0908)	-98.7629/ -93.1493	4.3234	1.9391	7.6288 [0.1062]	
			0.0443	-0.6667*** (-3.3214)	-0.1750 (-0.8522)	-100.8533/ -95.2397	5.5174	4.0284	6.1906 [0.1854]	
	M-TAR	1		-0.5677*** (-3.2067)	-0.0547 (-0.2185)	-100.6774/ -95.0638	5.4149	3.8491	5.2355 [0.2640]	
Russia	E-G	2	0	-0.7625* (-2.8726)		137.9187/ 145.2333			12.6160 [0.0130]	M-TAR
			-0.5089	-0.3144 (-0.7459)	-0.9107*** (-3.3649)	138.8633/ 146.2639	5.6618	1.7571	1.1959 [0.8788]	
	M-TAR	2	0	-0.2616 (-0.7007)	-1.0343*** (-3.6120)	137.3828/ 144.7834	6.5310*	3.18934	1.8189 [0.7690]	
			-0.2876	0.0489 (-0.1147)	-0.9875*** (-3.8417)	135.2674/ 142.6680	7.8215*	5.3158	3.8379 [0.4284]	
			-0.0837 (-1.0337)	-4.1528*** (-23.6797)	125.6723/ 133.0729	28.4104***	16.4861***	1.358 [0.8515]		

1. $AIC = T \ln(RSS) + 2n$; and $SBC = T \ln(RSS) + n \ln(T)$, where n = number of regressors and T = number of usable observations. RSS is the residual sum of squares. 2. This test follows a non-standard distribution so the test statistics are compared with critical values reported by Enders and Siklos (2001). 3. The numbers reported in this column are F -statistics of symmetric adjustment. The critical values are taken from Enders and Siklos (2001). 4. $Q(4)$ is the Ljung-Box Q -statistic for the joint hypothesis of no serial correlation among the first residuals. 5. Entries in parentheses in this column are the t -statistics for the null hypothesis $\rho_1 = 0$ and $\rho_2 = 0$ Critical values are taken from Enders and Granger (1998). 6. Numbers in brackets are p -value. 7. The ***, **, and * indicate significance at the 0.01, 0.05 and 0.1 levels, respectively.

converges to its long-run equilibrium τ at the rate of 41.47% for a positive deviation and 11.52% for a negative deviation. It is reasonable to conclude that the money demand functions in the BRICs follow nonlinear adjustment and the adjustment mechanisms of India, Brazil, and Russia are asymmetric.

Error-correction models

Before examining a nonlinear error-correction model, we investigate the appropriateness of a linear ECM. Based on the estimates of the long-run demand for money, the SBC was used to select the short-run dynamic model and the order of autoregression. The linear ECM for money demand with AR(4) is specified as follows:

$$\Delta(\ln M 2)_t = b_0 + b_1 ecm_{t-1} + \sum_{i=1}^4 b_{1i} \Delta(\ln M 2)_{t-i} + \sum_{i=0}^4 b_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^4 b_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^4 b_{4i} \Delta(\ln TD)_{t-i} + z_t \quad (7)$$

Where,

$$ecm_t = \ln M 2_t - \hat{\beta}_0 - \hat{\beta}_1 \ln GDP_t - \hat{\beta}_2 \ln EX_t - \hat{\beta}_3 \ln TD_t, \quad \text{it}$$

is the equilibrium error normalized on $\ln M 2_t$, b_1 is the adjustment coefficient of the equilibrium error, which is

$$\Delta(\ln M 2)_t = \alpha_0 + \gamma_1 S_{-Plus} \text{ }_{t-1} + \gamma_2 S_{-Minus} \text{ }_{t-1} + \sum_{i=1}^{k_1} \theta_{1i} \Delta(\ln M 2)_{t-i} + \sum_{i=0}^{k_2} \theta_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^{k_3} \theta_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^{k_4} \theta_{4i} \Delta(\ln TD)_{t-i} + v_t \quad (9)$$

$$\text{Where, } S_{-Plus}_{t-1} = I_t (\ln M 2_{t-1} - 1.2031 + 0.1821 \ln GDP_{t-1} - 3.5264 \ln EX_{t-1} + 0.1015 \ln TD_{t-1})$$

I_t = Heaviside indicator function, obtained by applying Chan's method to each country. The Heaviside indicator could be specified as $I_t = 1$ if $\varepsilon_{t-1} \geq 0.1365$ and $I_t = 0$ if $\varepsilon_{t-1} < 0.1365$. v_t is a white-noise disturbance. We apply the SBC criterion to determine the appropriate lag lengths and empirically find that, for all cases, the four lag lengths of and are all four (that is, $k_1 = k_2 = k_3 = k_4 = 4$). The estimated asymmetric error-correction models with consistent estimate of thresholds are shown in the last two columns of Table 3 to Table 6. The estimated coefficients of S_{-Plus}_{t-1} and S_{-Minus}_{t-1} determine the speed of adjustment for positive and negative deviations from fundamental values, respectively.

For the adjustments towards long-run equilibrium in China, Table 3 shows that there are 2.16% (5.91%)

expected to be negative. Not all of the coefficients in Equation 7 may be statistically significant in practice, and greater efficiency may actually be gained by removing the insignificant coefficients. We exclude those insignificant variables as long as their elimination does not produce evidence of serial correlation based on a Q-statistic at four lags. Using this procedure, variables are included, even when they are insignificant, if their deletion has resulted in serial correlation. The first and second columns of Table 3 to Table 6 report the estimation results of Equation 7. The linear ECM estimates appear to be reasonable with expected signs for India, Brazil, and Russia. The negative coefficient of the error-correction term reconfirms that the short-run adjustment moves the demand for money towards the long-run equilibrium.

However, Muscatelli and Spinelli (1996), Wolters et al. (1998) made the argument that the error correction to the short-run dynamics may not follow a linear process. First, OLS was used to estimate the long-run relationship is given by:

$$(\ln M 2)_t = \beta_0 + \beta_1 (\ln GDP)_t + \beta_2 (\ln EX)_t + \beta_3 (\ln TD)_t + \varepsilon_t \quad (8)$$

using Equation 8, in the case of China, the estimated asymmetric error-correction equations with the consistent estimates of the threshold is expressed as follows:

adjustments to the equilibrium level when differences in the previous disequilibrium term are above (below) the threshold value of 0.1365 and the adjustments are symmetric. For India, Table 4 shows that there are 2.99% (7.56%) adjustments to the equilibrium level when differences in the previous disequilibrium term are above and below the threshold value of 0.0481 and the adjustments are asymmetric. Finally, Table 6 shows that there are 0.37% (428.18%) adjustments in the Russia to the equilibrium level when differences in the previous disequilibrium term are above (below) the threshold value of -0.2876 and the adjustments are asymmetric. These results indicate that negative deviations from fundamental values are eliminated quicker than positive deviations.

More specifically, the speeds of adjustment towards long-run equilibrium in Russia are much faster in the lower regime than in the higher regime. However, for Brazil, Table 5 shows that there are 53.45% (4.52%)

Table 3. Estimates of the error-correction models for China.

Variable	Symmetric ²		Asymmetric ³	
constant	0.0214	(0.0054)***	0.0244	(0.0063)***
ΔlnM2 _{t-3}	0.6340	(0.1087)***	0.6119	(0.1034)***
ΔlnM2 _{t-4}	-0.2717	(0.1143)**	-0.2821	(0.1152)**
ΔlnEX _{t-2}	-0.4762	(0.1614)***	-0.4846	(0.1452)***
ΔlnTD _{t-2}	-0.0542	(0.0244)**	-0.0543	(0.0225)**
ECM _{t-1}	0.0409	(0.0170)**		
S_Plus _{t-1}			0.0216	(0.0259)
S_Minus _{t-1}			0.0591	(0.0260)**
Adj. R-squared	0.5634		0.5669	
RSS ⁵	0.0079		0.0078	
J-B ⁶	4.3634	[0.1129]	2.5551	[0.2787]
Q(4) ⁷	4.1119	[0.1280]	3.7076	[0.1566]
ARCH(4) ⁸	3.7193	[0.4453]	3.2888	[0.5107]
Variance ratio ⁹	0.9779			

1. Numbers in parentheses and brackets are standard errors and *p*-value, respectively.
 2. Symmetric error-correction model:

$$\Delta(\ln M2)_t = a_0 + b_1 ec_{t-1} + \sum_{i=1}^4 b_{1i} \Delta(\ln M2)_{t-i} + \sum_{i=0}^4 b_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^4 b_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^4 b_{4i} \Delta(\ln TD)_{t-i} + z_t$$

3. Asymmetric error-correction model:

$$\Delta(\ln M2)_t = \alpha_0 + \gamma_1 S_Plus_{t-1} + \gamma_2 S_Minus_{t-1} + \sum_{i=1}^{k_1} \theta_{1i} \Delta(\ln M2)_{t-i} + \sum_{i=0}^{k_2} \theta_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^{k_3} \theta_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^{k_4} \theta_{4i} \Delta(\ln TD)_{t-i} + v_t$$

where $S_Plus_{t-1} = I_t \hat{\mu}_{t-1}$, $S_Minus_{t-1} = (1 - I_t) \hat{\mu}_{t-1}$ such that $I_t = 1$ if $\mu_{t-1} \geq 0.1365$, $I_t = 0$ if $\mu_{t-1} < 0.1365$ and v_t is a white-noise disturbance.

- 4. The *** and ** indicate significance at the 0.01 and 0.05 levels, respectively.
- 5. RSS is sum of squared residuals.
- 6. J-B is the Jarque-Bera test of normality for the residual.
- 7. Q(4) is the Ljung-Box autocorrelation tests for the residual.
- 8. ARCH(4) is the autoregressive conditional heteroscedasticity test of Engle (1982) and has χ^2 distribution with 4 degrees of freedom.
- 9. Variance ratio = $\sigma_{NL}^2 / \sigma_L^2$, σ_{NL}^2 is the variance for the residual of asymmetric model, σ_L^2 is the variance for the residual of symmetric model.

adjustments to the equilibrium level when differences in the previous disequilibrium term are above and below the threshold value of 0.0497 and the adjustments are asymmetric. These indicate that positive deviations from fundamental values are eliminated quicker than negative deviations. Furthermore, we found that the coefficients on the error-correction terms are small except for that on S_Plus_{t-1} in the equation for Brazil and S_Minus_{t-1} in the equation for Russia. Other adjustments are small and statistically insignificant. In particular, there are only 0.37% adjustments in Russia to revert to the equilibrium level.

For comparison, estimates of both symmetric and asymmetric error-correction models are presented.

Estimates for the asymmetric adjustments are presented in the last two columns, followed by the estimates from the symmetric error-correction models. For symmetric and asymmetric error-correction models, the Ljung-Box's *Q*-statistic fails to reject the hypothesis of no autocorrelation in residuals. In addition, the ARCH statistic of Engle (1982) fails to reject the hypothesis of no autoregressive conditional heteroscedasticity in residuals except for the linear ECM of Russia is 28.3764. The Jarque-Bera (J-B) statistic fails to reject the hypothesis of normality in residuals except for the linear ECM of Russia. However, the variance ratios are smaller than 1 for each country, we conjecture that a nonlinear model may be appropriate to describe the dynamics of money

Table 4. Estimates of the error-correction models for India.

Variable	Symmetric ²		Asymmetric ³	
constant	0.0266	(0.0036)***	0.0249	(0.0040)***
$\Delta \ln M2_{t-4}$	-0.2795	(0.1277)**	-0.2447	(0.1324)*
$\Delta \ln GDP_{t-2}$	0.1595	(0.0440)***	0.1777	(0.0477)***
$\Delta \ln TD_{t-2}$	-0.0740	(0.0243)***	-0.0733	(0.0243)***
ECM _{t-1}	-0.0527	(-0.0452)		
S_Plus _{t-1}			0.0299	(-0.0946)
S_Minus _{t-1}			-0.0756	(-0.0508)
Adj. R-squared	0.4138		0.4139	
RSS ⁵	0.0090		0.0088	
J-B ⁶	4.4842	[0.1062]	3.6867	[0.1583]
Q(4) ⁷	1.1621	[0.8843]	1.8236	[0.7682]
ARCH(4) ⁸	7.2604	[0.1228]	6.5780	[0.1599]
Variance ratio ⁹			0.9755	

1. Numbers in parentheses and brackets are standard errors and p -value, respectively.

2. Symmetric error-correction model:

$$\Delta(\ln M2)_t = a_0 + b_1 ecM_{t-1} + \sum_{i=1}^4 b_{1i} \Delta(\ln M2)_{t-i} + \sum_{i=0}^4 b_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^4 b_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^4 b_{4i} \Delta(\ln TD)_{t-i} + z_t$$

3. Asymmetric error-correction model:

$$\Delta(\ln M2)_t = \alpha_0 + \gamma_1 S_Plus_{t-1} + \gamma_2 S_Minus_{t-1} + \sum_{i=1}^{k_1} \theta_{1i} \Delta(\ln M2)_{t-i} + \sum_{i=0}^{k_2} \theta_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^{k_3} \theta_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^{k_4} \theta_{4i} \Delta(\ln TD)_{t-i} + v_t$$

where $S_Plus_{t-1} = I_t \hat{\mu}_{t-1}$, $S_Minus_{t-1} = (1 - I_t) \hat{\mu}_{t-1}$ such that $I_t = 1$ if

$\Delta \mu_{t-1} \geq 0.0481$, $I_t = 0$ if $\Delta \mu_{t-1} < 0.0481$ and v_t is a white-noise disturbance.

4. The ***, **, and * indicate significance at the 0.01, 0.05 and 0.1 levels, respectively.

5. RSS is sum of squared residuals.

6. J-B is the Jarque-Bera test of normality for the residual.

7. Q(4) is the Ljung-Box autocorrelation tests for the residual.

8. ARCH (4) is the autoregressive conditional heteroscedasticity test of Engle (1982) and has χ^2 distribution with 4 degrees of freedom.

9. Variance ratio = $\sigma_{NL}^2 / \sigma_L^2$, σ_{NL}^2 is the variance for the residual of asymmetric model, σ_L^2 is the variance for the residual of symmetric model.

money demand. More specifically, the variance ratio of Russia is 0.0103. Because the variance ratio of Russia is much smaller than 1, we argue that the linear ECM of Russia must be misspecification.

These empirical Findings from Table 3 to Table 6 indicate that the asymmetric ECM may be appropriate to describe the dynamics of the BRICs money demand. In other words, the short-run dynamics towards the long-run equilibrium of the money demand in the BRICs follow nonlinear adjustment. It implies that, within the context of money demand, households and the government may respond differently when the economy is in a different regime under the specific threshold and can provide useful information about portfolio allocation. Although the

linear ECM specification gives similar estimation on parameters, the nonlinear specification outperforms the linear ECM when the country experiences a volatile economic condition as BRICs. Our result, the estimated coefficient of error correction term, indicates that there is cointegration among variables in money demand function. The results also reveal that the estimated elasticity coefficients of real income are positive and negative as expected. For exchange rate, we obtain the results of negative coefficients which support the currency substitution symptom in BRICs. It is worth noting that, in long-run, even the coefficient of exchange rate has negative sign, supporting the currency substitution phenomenon in BRICs.

Table 5. Estimates of the error-correction models for Brazil.

Variable	Symmetric ²		Asymmetric ³	
constant	0.0175	(0.0050)***	0.0188	(0.0048)***
$\Delta \ln M2_{t-1}$	0.2754	(0.1499)*	0.4138	(0.1536)***
$\Delta \ln M2_{t-2}$	0.2947	(0.1628)*	0.2976	(0.1537)*
$\Delta \ln M2_{t-4}$	-0.3863	(0.1265)***	-0.3866	(0.1194)***
$\Delta \ln GDP_{t-1}$	0.3765	(0.1940)*	0.4095	(0.1837)**
$\Delta \ln GDP_{t-2}$	0.4230	(0.2293)*	0.4240	(0.2165)*
$\Delta \ln EX_{t-2}$	-0.1215	(0.0453)**	-0.1142	(0.0428)**
$\Delta \ln TD_{t-2}$	0.0360	(0.0194)*	0.0446	(0.0186)**
ECM _{t-1}	-0.0014	(-0.0939)		
S_Plus _{t-1}			-0.5345	(0.2460)**
S_Minus _{t-1}			0.0452	(-0.0909)
Adj. R-squared	0.3111		0.3861	
RSS ⁵	0.0203		0.0176	
J-B ⁶	0.1429	[0.9311]	0.9349	[0.6266]
Q(4) ⁷	2.0746	[0.7220]	2.8011	[0.5916]
ARCH(4) ⁸	5.2508	[0.2625]	3.2870	[0.5110]
Variance ratio ⁹		0.8658		

1. Numbers in parentheses and brackets are standard errors and p -value, respectively.

2. Symmetric error-correction model:

$$\Delta(\ln M2)_t = a_0 + b_1 ecM_{t-1} + \sum_{i=1}^4 b_{1i} \Delta(\ln M2)_{t-i} + \sum_{i=0}^4 b_{2i} \Delta(\ln GDP)_{t-i} \\ + \sum_{i=0}^4 b_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^4 b_{4i} \Delta(\ln TD)_{t-i} + z_t$$

3. Asymmetric error-correction model:

$$\Delta(\ln M2)_t = \alpha_0 + \gamma_1 S_Plus_{t-1} + \gamma_2 S_Minus_{t-1} + \sum_{i=1}^{k_1} \theta_{1i} \Delta(\ln M2)_{t-i} \\ + \sum_{i=0}^{k_2} \theta_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^{k_3} \theta_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^{k_4} \theta_{4i} \Delta(\ln TD)_{t-i} + v_t$$

where $S_Plus_{t-1} = I_t \hat{\mu}_{t-1}$, $S_Minus_{t-1} = (1 - I_t) \hat{\mu}_{t-1}$ such that $I_t = 1$ if

$$\Delta \mu_{t-1} \geq 0.0497, I_t = 0 \text{ if } \Delta \mu_{t-1} < 0.0497 \text{ and } v_t \text{ is a white-noise disturbance.}$$

4. The ***, **, and * indicate significance at the 0.01, 0.05 and 0.1 levels, respectively.

5. RSS is sum of squared residuals.

6. J-B is the Jarque-Bera test of normality for the residual.

7. Q(4) is the Ljung-Box autocorrelation tests for the residual.

8. ARCH (4) is the autoregressive conditional heteroscedasticity test of Engle (1982) and has χ^2 distribution with 4 degrees of freedom.

9. Variance ratio = $\sigma_{NL}^2 / \sigma_L^2$, σ_{NL}^2 is the variance for the residual of asymmetric model, σ_L^2 is the variance for the residual of symmetric model.

Conclusions

A significant volume of empirical studies has shown that financial sequence data are commonly subject to non-linear dynamic adjustments. Enders and Granger (1998) determined that when there is asymmetric adjustment to economic variables, traditional linear unit root tests and cointegration tests have low power. The information on the structure of money demand function is very important for policy makers in designing effective monetary policy. This study aims to empirically investigate the long-run

equilibrium relationship among real M2 money balance, real income, real exchange rate and deposit rate in the BRICs using the asymmetrical TAR and M-TAR cointegration tests developed by Enders and Granger (1998) and Enders and Siklos (2001). A modified money demand function, motivated by the literature of currency substitution, is applied in our empirical analysis in which a real exchange rate variable is included in the function. The TAR and M-TAR cointegration methods provided strong evidence of the long-run equilibrium relationship characterized by asymmetric adjustment. Using data from 1994

Table 6. Estimates of the error-correction models for Russia.

Variable	Symmetric ²		Asymmetric ³	
constant	-0.0423	(0.0870)	0.0321	(0.0091)***
$\Delta \ln M2_{t-1}$	0.7197	(0.2536)***	-0.0106	(0.0290)
$\Delta \ln M2_{t-2}$	5.6747	(1.3888)***	-0.7519	(0.1809)***
$\Delta \ln GDP_{t-1}$	1.0888	(1.8634)	0.5963	(0.1940)***
$\Delta \ln GDP_{t-2}$	4.7176	(1.9152)**	0.4641	(0.2165)**
$\Delta \ln GDP_{t-3}$	0.5584	(1.9826)	0.4949	(0.2041)**
$\Delta \ln GDP_{t-4}$	4.4700	(1.8050)**	0.1145	(0.2020)
$\Delta \ln EX_{t-2}$	-2.1869	(0.8831)**	-0.0577	(0.0988)
ECM _{t-1}	-0.7645	(0.2635)***		
S_Plus _{t-1}			-0.0037	(0.0301)
S_Minus _{t-1}			-4.2818	(0.0665)***
Adj. R-squared	0.3727		0.9934	
RSS ⁵	9.9761		0.1028	
J-B ⁶	207.4273	[0.0000]	0.6595	[0.7191]
Q(4) ⁷	0.7361	[0.9468]	3.8722	[0.4236]
ARCH(4) ⁸	28.3764	[0.0000]	0.6604	[0.9561]
Variance ratio ⁹		0.0103		

1. Numbers in parentheses and brackets are standard errors and *p*-value, respectively.

2. Symmetric error-correction model:

$$\Delta(\ln M2)_t = a_0 + b_1 ec_{t-1} + \sum_{i=1}^4 b_{1i} \Delta(\ln M2)_{t-i} + \sum_{i=0}^4 b_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^4 b_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^4 b_{4i} \Delta(\ln TD)_{t-i} + z_t$$

3. Asymmetric error-correction model:

$$\Delta(\ln M2)_t = \alpha_0 + \gamma_1 S_Plus_{t-1} + \gamma_2 S_Minus_{t-1} + \sum_{i=1}^{k_1} \theta_{1i} \Delta(\ln M2)_{t-i} + \sum_{i=0}^{k_2} \theta_{2i} \Delta(\ln GDP)_{t-i} + \sum_{i=0}^{k_3} \theta_{3i} \Delta(\ln EX)_{t-i} + \sum_{i=0}^{k_4} \theta_{4i} \Delta(\ln TD)_{t-i} + v_t$$

where $S_Plus_{t-1} = I_t \hat{\mu}_{t-1}$, $S_Minus_{t-1} = (1 - I_t) \hat{\mu}_{t-1}$ such that $I_t = 1$ if

$\Delta \mu_{t-1} \geq -0.2876$, $I_t = 0$ if $\Delta \mu_{t-1} < -0.2876$ and v_t is a white-noise disturbance.

4. The ***, **, and * indicate significance at the 0.01, 0.05 and 0.1 levels, respectively.

5. RSS is sum of squared residuals.

6. J-B is the Jarque-Bera test of normality for the residual.

7. Q(4) is the Ljung-Box autocorrelation tests for the residual.

8. ARCH (4) is the autoregressive conditional heteroscedasticity test of Engle (1982) and has χ^2 distribution with 4 degrees of freedom.

9. Variance ratio = $\sigma_{NL}^2 / \sigma_L^2$, σ_{NL}^2 is the variance for the residual of asymmetric model, σ_L^2 is the variance for the residual of symmetric model.

1994 to 2007, this study found that the short-run dynamics towards the long-run equilibrium of the money demand in the BRICs follow nonlinear adjustment. Although the linear ECM specification gives similar estimation on parameters, the nonlinear specification outperforms the linear ECM when judged by such diagnostic tests as serial correlation, the ARCH effect, variance ratio, and adjusted R². These findings offer a new piece of evidence supporting the existence of the long-run equilibrium relationship of the BRICs money demand function with asymmetric adjustment.

The estimated model in this study can provide useful policy guidelines to the BRICs' central banks in their quest for price stability and narrowing the divergence between potential output and actual output. It is argued that any persistent disequilibrium in the money market can bring about rising future prices and widening gap between actual and potential output. Thus, if the objectives of these countries are to minimize the output gap and price instability, they should avoid creating unnecessary disequilibrium in the money market. That is why the stable long-run relationship between the real demand for

money and other macroeconomic variables serves as the guideline for macro policy. Therefore, this study is the first attempt to model symmetric and asymmetric error-correction models for the demand for money in the BRICs.

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Full Length Research Paper

Fuzzy MCDM approach to evaluate service strategies of customer value for global shipping carrier-based logistics service providers

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The key purpose of this research is to develop a fuzzy multiple criteria decision-making (MCDM) algorithm to evaluate service strategies of customer value (CV) for global shipping carrier-based logistics service providers (GSLPs) based on the shippers' perspective in Taiwan. At first, a literature review was introduced. Subsequently, a proposed fuzzy MCDM algorithm is developed. Finally, the systematic approach is to perform the empirical survey via questionnaires. The result shows providing customization is the most suitable service strategy of CV for GSLPs. Differentiation, and providing long-term product values are ranked in the second and third places. The strategy of service operation and delivery system is the lowest ranked. It is suggested that the customization of services should be paid more attention by the GSLPs.

Key words: Customer value, shipping, fuzzy multiple criteria decision-making (MCDM).

INTRODUCTION

The global shipping carrier-based logistics service providers (GSLPs) are emerged due to the acute competitions and many changes among global shipping carriers (GSCs) focusing on business logistics (Ding, 2010). Total solutions of many logistics services are integrated by these GSCs, and as a result, the goals of customer satisfaction and customer value (CV) in the shipping market are striving toward by GSCs. Finally, the uses of third-parties of GSLPs in GSCs are growing rapidly.

Since providing high CV is critical for both GSLPs and shippers, evaluating critical factors of CV are an important issue to study. Based on the Johansson et al. (1993) viewpoints, the criteria of CV can be evaluated by four key value metrics, which are service, quality, cost, and cycle time, respectively. According to their reference, 'any company should concentrate on improving the product quality and/or service, and at the same time reducing the cycle time and cost to the customer.' Ding (2010) had evaluated the critical factors influencing CV for GSLPs based on the shippers' perspective in Taiwan. The initially important factors of the four key value metrics with 17

factors are derived to employ in the empirical survey via fuzzy AHP approach. Two significant contributions are showed. The first result showed that quality is the highest aspect, and the time is the lowest one. The second one showed that the top four critical factors influencing CV are reasonableness of price, related direct costs, safety, and customer satisfaction, respectively.

In the services society, there is a scramble for customers everyday. Drucker (2002) had referred that the most important task of an enterprise is creating customers, inasmuch as it includes good graces of customers and it raises creation of CV. Business practice shows that the cost of endeavoring to get a new customer is higher than to maintain an old one. To attract customers to keep the loyal ones up, how to provide suitable service strategies of creating CV to keep regular patrons is a secondly important issue.

However, experience has shown that evaluating service strategies for GSLPs is no easy matter. At the same time, since evaluating the service strategies for GSLPs with high CV is beneficial for fascinating with the purchasing

behavior to shippers. It involves a multitude of complex considerations and a decision-making tool is therefore crucial (Belton and Stewart, 2002).

The evaluation of service strategies for GSLPs poses a unique characteristic of multiple criteria decision-making (MCDM). The criteria are usually subjective in nature and often changing with the decision-making conditions, which creates the ambiguous and uncertain nature among the importance weights of criteria (or sub-criteria), and the performance values of alternatives.

The author, therefore, adopts the fuzzy set theory (Zadeh, 1965), combing with MCDM method as an evaluation tool to improve the quality of the survey. Yet, we can also refer to Ding's study in 2010, he suggested that a complete hierarchy can be constructed to evaluate the attractiveness of alternatives in the future study. In this paper, some suitable service strategies on the alternatives layer would be added to construct a complete hierarchy and then to evaluate these service strategies by using a systematic approach.

Therefore, this paper is based on the Ding's study, which involved the criteria and sub-criteria influencing CV, to evaluate the service strategies of CV for GSLPs in Taiwan. In the light of this, a fuzzy MCDM approach is used to evaluate service strategies of CV for GSLPs.

In summary, the aim of this paper is to develop a fuzzy MCDM algorithm to improve the quality of decision-making in evaluating service strategies of CV for GSLPs.

The next section presents a review of some theoretical concepts and methods. Consequently, an empirical survey is studied.

Finally, some discussions and conclusions are made.

THEORETICAL CONCEPTS AND METHODS

In this section, some of the theoretical concepts and methods used in this section are briefly introduced.

These include the fuzzy set theory, trapezoidal fuzzy numbers, algebraic operations of fuzzy numbers, linguistic values, graded mean integration representation method, and systematic steps of the proposed algorithm of fuzzy MCDM, respectively.

Fuzzy set theory

The fuzzy set theory (Zadeh, 1965) is designed to deal with the extraction of the primary possible outcome from a multiplicity of information that is expressed in vague and imprecise terms. Fuzzy set theory treats vague data as possibility distributions in terms of set memberships.

Once determined and defined, the sets of memberships in possibility distributions can be effectively used in logical reasoning.

Trapezoidal fuzzy numbers

A fuzzy number A (Dubois and Prade, 1978) in real line \mathfrak{R} is a trapezoidal fuzzy number, if its membership function $f_A : \mathfrak{R} \rightarrow [0, 1]$ is

$$f_A(x) = \begin{cases} (x-c)/(a-c), & c \leq x \leq a \\ 1, & a \leq x \leq b \\ (x-d)/(b-d), & b \leq x \leq d \\ 0, & otherwise \end{cases} \quad (1)$$

with $-\infty < c \leq a \leq b \leq d < \infty$. The trapezoidal fuzzy number can be denoted by (c, a, b, d) .

The x in interval $[a, b]$ gives the maximal grade of $f_A(x)$, i.e. $f_A(x) = 1$; it is the most probable value of the evaluation data. In addition, c and d are the lower and upper bounds of the available area for the evaluation data. They are used to reflect the fuzziness of the evaluation data. The narrower the interval $[c, d]$, the lower the fuzziness of the evaluation data.

Trapezoidal fuzzy numbers are easy to use and interpret. For example, 'approximately 100' and 'approximately between 100 and 110' can be represented by $(95, 100, 100, 106)$ and $(95, 100, 110, 116)$, respectively. They can also be represented with more leeway by $(90, 100, 100, 113)$ and $(87, 100, 110, 124)$, respectively. In addition, a non-fuzzy number, an exact number a , can be represented by (a, a, a, a) . For example, 'a value of 100' can be represented by $(100, 100, 100, 100)$.

The algebraic operations of fuzzy numbers

Let $A_1 = (c_1, a_1, b_1, d_1)$ and $A_2 = (c_2, a_2, b_2, d_2)$ be fuzzy numbers. According to the function principle (Chen, 1985), the algebraic operations of any two fuzzy numbers A_1 and A_2 can be expressed as:

(1) Fuzzy addition, \oplus :

$$A_1 \oplus A_2 = (c_1 + c_2, a_1 + a_2, b_1 + b_2, d_1 + d_2)$$

Where, $c_1, a_1, b_1, d_1, c_2, a_2, b_2,$ and d_2 are any real numbers.

(2) Fuzzy subtraction, \ominus :

$$A_1 \ominus A_2 = (c_1 - d_2, a_1 - b_2, b_1 - a_2, d_1 - c_2),$$

Where, $c_1, a_1, b_1, d_1, c_2, a_2, b_2,$ and d_2 are any real numbers.

(3) Fuzzy multiplication, \otimes :

- (i) $k \otimes A_2 = (kc_2, ka_2, kb_2, kd_2), \quad k \in \mathfrak{R}, k \geq 0;$
- (ii) $A_1 \otimes A_2 = (c_1c_2, a_1a_2, b_1b_2, d_1d_2),$

Where, $c_1, a_1, b_1, d_1, c_2, a_2, b_2,$ and d_2 are all nonzero positive real numbers.

(4) Fuzzy division, \oslash :

$$(i) (A_1)^{-1} = (c_1, a_1, b_1, d_1)^{-1} = (1/d_1, 1/b_1, 1/a_1, 1/c_1),$$

Where, $c_1, a_1, b_1,$ and d_1 are all positive real numbers or all

Goal



Criteria



Sub-criteria



Alternatives



Figure 1. Hierarchy structure.

negative real numbers.

$$(ii) A_1 \oslash A_2 = (c_1/d_2, a_1/b_2, b_1/a_2, d_1/c_2),$$

Where, $c_1, a_1, b_1, d_1, c_2, a_2, b_2,$ and d_2 are all nonzero positive real numbers.

Linguistic values

In fuzzy decision environments, two preference ratings can be used. They are fuzzy numbers and linguistic values characterized by fuzzy numbers (Zadeh, 1975; 1976). Depending on practical needs, decision-makers may apply one or both of them. In this paper, the importance weights of criteria and sub-criteria are used the data of Ding's study in 2010. The rating set is used to analytically express the linguistic values and describe how good or poor of the involved alternatives against various sub-criteria.

In this paper, the rating set is defined as $S = \{VP, P, F, G, VG\}$; where VP =Very Poor, P =Poor, F =Fair, G =Good, and VG =Very Good. Here, we define the linguistic values of $VP=(0, 0, 0.2, 0.3)$, $P=(0.2, 0.3, 0.4, 0.5)$, $F=(0.4, 0.5, 0.6, 0.7)$, $G=(0.6, 0.7, 0.8, 0.9)$, and $VG=(0.8, 0.9, 1, 1)$, respectively.

Graded mean integration representation method

In a fuzzy decision-making environment, ranking the alternatives under consideration is essential. For matching the fuzzy MCDM algorithm developed in this paper, and solving the problem powerfully, the graded mean integration representation (GMIR) method, proposed by Chen and Hsieh (2000), is used to rank the final ratings of alternatives.

Let $A_i = (c_i, a_i, b_i, d_i), i = 1, 2, \dots, n,$ be n trapezoidal fuzzy numbers. By the GMIR method, the GMIR value $P(A_i)$ of A_i is

$$P(A_i) = \frac{c_i + 2a_i + 2b_i + d_i}{6} \tag{2}$$

Suppose $P(A_i)$ and $P(A_j)$ are the GMIR values of the trapezoidal fuzzy numbers A_i and A_j , respectively. We define:

1. $A_i > A_j \Leftrightarrow P(A_i) > P(A_j),$
2. $A_i < A_j \Leftrightarrow P(A_i) < P(A_j),$
3. $A_i = A_j \Leftrightarrow P(A_i) = P(A_j).$

Fuzzy MCDM algorithm

A stepwise description of the fuzzy MCDM algorithm for evaluating the service strategies of CV for GSLPs is proposed as follows:

Step 1. Development of hierarchical structure

A hierarchy structure is the framework of system structure. It is not only useful in studying the interaction among the elements involved in each layer, but it can also help decision-makers to explore the impact of different elements on the evaluated system. Figure 1 is a complete hierarchical structure of evaluating the service strategies of CV for GSLPs with k criteria, $n_1 + \dots + n_t + \dots + n_k$ sub-criteria and m alternatives.

As aforementioned and according to Ding's study in 2010, four criteria and seventeen sub-criteria are adopted in this paper, and their codes are shown in parentheses. They are:

Service (C₁): This criterion includes five sub-criteria, that is, providing diversity of value-added services (C_{11}), availability (C_{12}), reliability (C_{13}), providing adequacy of physical facilities and

equipment (C_{14}), and increasing marketing channel and network (C_{15}), respectively.

Quality (C_2): This criterion includes five sub-criteria, that is, improving customer satisfaction (C_{21}), safety (C_{22}), accuracy and precision of shipments (C_{23}), skills and knowledge of operating personnel (C_{24}), and capability of total quality service and integrated process management (C_{25}), respectively.

Cost (C_3): This criterion includes three sub-criteria, that is, providing reasonableness of price (C_{31}), reducing related operating costs of shipments (direct costs) (C_{32}), and reducing related overhead, charges and fees (indirect costs) (C_{33}), respectively.

Time (C_4): This criterion includes four sub-criteria that is, reducing lead time of core logistics services (C_{41}), implementing integrated logistics information system (C_{42}), reducing the non-value-adding time (C_{43}), and quick responsiveness (C_{44}), respectively.

As for the alternatives layer, four suitable service strategies are drawn with related literature (Anderson and Vincze, 2000; Christopher, 1998; Drucker, 1992; 2002; Heskett, 1986; Heaver et al., 2001; Johansson et al., 1993; Kotler, 2000; Porter, 1985; Stock and Lambert, 2001) and interviewing with executive managers of GSLPs' companies in this paper. The four service strategies are deemed as the evaluating alternatives in this paper, and their code names are shown in parentheses:

Customization of services (A_1): It is a marketing variable, which 'describes the ability of the customer to affect personally the nature of the service delivered' (Fitzsimmons and Fitzsimmons, 1994). It is different from the standardization.

For an enterprise, the low cost is obtained by the standardization of mass production; however, for customers, they like changes and variations more. Hence, the GSLPs need to combine their input systems with the flexibility to specifically fit into a particular customer's unique needs.

Differentiation (A_2): It is a basic service strategy for sustainable competitive advantage (Porter, 1985). Anderson and Vincze (2000) referred that it is a strategy for 'distinguishing one company's product from its competitors' on the basis of greater perceived benefits and/or more value.' It is based on value-added benefits. We can recall that the keen competitions among the main GSCs, therefore, they intensely emphasize upon providing integrated logistics services to create significantly added value for their customers. Hence, the GSLPs can use this strategy for their business.

Service operation and delivery system (A_3): In fact, the service transmitted by service providers should not only focus on their core service, but also consider how, why, where, and when in the service system to ascertain the total customers' satisfaction. As we know that an effective delivery process can be an important quality improvement tool that allows a service provider to obtain customer feedback which is serviceable in improving to increase customer satisfaction, loyalty, and profit margins in shipping chain. Therefore, a service system should design well to make improvement that increases overall performance.

Long-term product values (A_4): Lester (2009) had referred that a successful product can deliver the value to its customers, and at the same time, it can create revenue to the business. A value-driven production management approach can be employed in this paper. This approach is a repeatable process based on business best practices to deliver successful products. The product value, including functional promotion and services diversification, can be made to meet the customers need. Providing long-term product values for customers is a critical strategy.

Step 2. Computation of aggregating evaluation ratings of all feasible alternatives

Assume the decision-makers are responsible for assessing the appropriateness of all feasible alternatives, under each of the sub-criteria above the feasible alternatives layer. For this, the appropriateness should be modeled for computing the aggregating evaluation ratings. This is done as follows:

Let $W_t = (c_t, a_t, b_t, d_t)$, $0 \leq c_t \leq a_t \leq b_t \leq d_t \leq 1$, $t = 1, 2, \dots, k$, be the weight of C_t . Let $W_{ij} = (c_{ij}, a_{ij}, b_{ij}, d_{ij})$, $0 \leq c_{ij} \leq a_{ij} \leq b_{ij} \leq d_{ij} \leq 1$, $t = 1, 2, \dots, k$; $j = 1, 2, \dots, n_t$, be the weight of criterion C_{ij} . In this paper, the importance weights of W_t and W_{ij} are used from the Ding's study in 2010.

Let $m_{ijq} = (c_{ijq}, a_{ijq}, b_{ijq}, d_{ijq})$, $0 \leq c_{ijq} \leq a_{ijq} \leq b_{ijq} \leq d_{ijq} \leq 1$, $i = 1, 2, \dots, m$; $t = 1, 2, \dots, k$; $j = 1, 2, \dots, n_t$; $q = 1, 2, \dots, n$, be the appropriateness rating assigned to alternative A_i by the q^{th} decision-maker for criterion C_{ij} . Then, the appropriateness rating of alternative A_i can be represented as

$$M_{ij} = (c_{ij}, a_{ij}, b_{ij}, d_{ij}), \quad \text{where } c_{ij} = \frac{1}{n} \sum_{q=1}^n c_{ijq},$$

$$a_{ij} = \frac{1}{n} \sum_{q=1}^n a_{ijq}, \quad b_{ij} = \frac{1}{n} \sum_{q=1}^n b_{ijq}, \quad d_{ij} = \frac{1}{n} \sum_{q=1}^n d_{ijq}.$$

The aggregation appropriateness rating of alternative A_i for the n_t sub-criteria under criterion C_t ($t = 1, 2, \dots, k$) can be denoted as:

$$R_{it} = \frac{1}{n_t} \otimes \left[(M_{it1} \otimes W_{t1}) \oplus (M_{it2} \otimes W_{t2}) \oplus \dots \oplus (M_{itn_t} \otimes W_{tn_t}) \right] \quad (3)$$

Because $M_{ij} = (c_{ij}, a_{ij}, b_{ij}, d_{ij})$ and $W_{ij} = (c_{ij}, a_{ij}, b_{ij}, d_{ij})$, we can denote

$$R_{it} \cong (Y_{it}, Q_{it}, G_{it}, Z_{it}), \quad \text{where } Y_{it} = \sum_{j=1}^{n_t} c_{ij} c_{ij} / n_t,$$

$$Q_{it} = \sum_{j=1}^{n_t} a_{ij} a_{ij} / n_t, \quad G_{it} = \sum_{j=1}^{n_t} b_{ij} b_{ij} / n_t,$$

$$Z_{it} = \sum_{j=1}^{n_t} d_{ij} d_{ij} / n_t, \quad \text{for } i = 1, 2, \dots, m; \quad t = 1, 2, \dots, k.$$

Furthermore, the final aggregation appropriateness rating of alternative A_i can be denoted as:

Table 1. Importance weights of all criteria and sub-criteria.

Criteria /Sub-criteria	Crisp weights	Criteria /Sub-criteria	Crisp weights
C_1	0.2642	C_{23}	0.1287
C_2	0.2950	C_{24}	0.1494
C_3	0.2252	C_{25}	0.2116
C_4	0.2156	C_{31}	0.4582
C_{11}	0.2514	C_{32}	0.3679
C_{12}	0.2312	C_{33}	0.1739
C_{13}	0.2324	C_{41}	0.3066
C_{14}	0.1469	C_{42}	0.2264
C_{15}	0.1381	C_{43}	0.2103
C_{21}	0.2414	C_{44}	0.2567
C_{22}	0.2689		

Source: Ding (2010)

$$F_i = \frac{1}{k} \otimes [(R_{i1} \otimes W_1) \oplus (R_{i2} \otimes W_2) \oplus \dots \oplus (R_{it} \otimes W_t) \oplus \dots \oplus (R_{ik} \otimes W_k)] \tag{4}$$

Because $W_j = (c_j, a_j, b_j, d_j)$, we can denote $F_i \cong (Y_i, Q_i, G_i, Z_i)$,

Where, $Y_i = \sum_{t=1}^k Y_{it} c_t / k$, $Q_i = \sum_{t=1}^k Q_{it} a_t / k$, $G_i = \sum_{t=1}^k G_{it} b_t / k$,
 $Z_i = \sum_{t=1}^k Z_{it} d_t / k$, for $i = 1, 2, \dots, m$.

Step 3. Choice of optimal alternative

By Equation (2), the ranking value of the aggregation appropriateness rating of alternative A_i can be obtained and denoted as:

$$P(F_i) = \frac{Y_i + 2Q_i + 2G_i + Z_i}{6} \tag{5}$$

By the ranking rules proposed above, the final ranking values of the m alternatives can be obtained, and finally the decision-makers can choose the optimal alternative.

RESULTS

In this section, an empirical study of evaluating service strategies of CV for GSLPs in Taiwan is carried out to demonstrate the computational process as earlier described. The process of the algorithm is empirically implemented, step by step, as follows.

Step 1: Questionnaire design. In this step, four criteria, seventeen sub-criteria with four alternatives were used to

design the questionnaire and to obtain information on the appropriateness of all feasible alternatives versus various sub-criteria. We used the top 500 exporters and importers in Taiwan as the population, recorded in the ‘Directory of Excellent Exporters and Importers in 2008, Taiwan (ROC)’ (Ministry of Economic Affairs: Taiwan, 2009). The questionnaire was filled in by the export/import department of each company on December in 2009 to April in 2010. In addition, the surveys were repeatedly completed through phone calls and over-and-over in-person interviews by the author. The reliability, that is, Cronbach’s alpha, of the questionnaire was 0.8479. Finally, a total of 217 valid responses were collected, from the 500 exporters and importers, which represents 43.40% of the total population.

Step 2: The crisp weights of criteria and sub-criteria are used from Ding’s study in 2010, and the importance weights are showed in Table 1. Then, we use the linguistic rating set S to evaluate the appropriateness ratings of four alternatives versus seventeen sub-criteria. To sum up the results surveyed in the questionnaire, the results of appropriateness ratings of four alternatives versus all sub-criteria are shown in Table 2.

Step 3: We calculate the aggregation evaluation ratings of four alternatives. By utilizing equations (3), the aggregation appropriateness ratings of four alternatives versus all sub-criteria (R_{it}) can be obtained; the results are shown in Table 3. Finally, by using equation (4) and (5), the final aggregation appropriateness ratings of four alternatives (F_i) and the ranking values can be calculated; the results can be shown in Table 4. We can see that the ranking order for the four service strategies is customization of services (A_1), differentiation (A_2), long-term product values (A_4), and service operation and delivery system (A_3), respectively. Therefore, we recommend that customization of services be the most suitable service strategy for the

Table 2. Appropriateness ratings of four alternatives versus all sub-criteria.

Sub-criteria	A ₁	A ₂	A ₃	A ₄
C ₁₁	(0.5889, 0.6861, 0.7889, 0.8505)	(0.6037, 0.7037, 0.8037, 0.8606)	(0.5056, 0.5981, 0.7056, 0.7810)	(0.6037, 0.7009, 0.8037, 0.8630)
C ₁₂	(0.60, 0.6991, 0.80, 0.8653)	(0.5574, 0.6519, 0.7574, 0.8208)	(0.4667, 0.5565, 0.6667, 0.7514)	(0.5454, 0.6398, 0.7454, 0.8171)
C ₁₃	(0.5750, 0.6745, 0.7750, 0.8449)	(0.5194, 0.6167, 0.7194, 0.8009)	(0.4083, 0.4940, 0.6083, 0.7014)	(0.4769, 0.5671, 0.6769, 0.7583)
C ₁₄	(0.5991, 0.6954, 0.7991, 0.8569)	(0.5602, 0.6565, 0.7602, 0.8264)	(0.4954, 0.5824, 0.6954, 0.7676)	(0.5380, 0.6292, 0.7380, 0.8051)
C ₁₅	(0.5213, 0.6130, 0.7213, 0.7963)	(0.5296, 0.6222, 0.7296, 0.8014)	(0.4194, 0.5028, 0.6194, 0.7093)	(0.4222, 0.5069, 0.6222, 0.7120)
C ₂₁	(0.5639, 0.6639, 0.7639, 0.8319)	(0.5722, 0.6699, 0.7722, 0.8319)	(0.4194, 0.5032, 0.6194, 0.7042)	(0.3537, 0.4361, 0.537, 0.6454)
C ₂₂	(0.5917, 0.6921, 0.7926, 0.8565)	(0.6157, 0.7144, 0.8157, 0.8699)	(0.4120, 0.4968, 0.6120, 0.7005)	(0.3370, 0.4204, 0.5370, 0.6338)
C ₂₃	(0.5630, 0.6630, 0.7630, 0.8269)	(0.5944, 0.6931, 0.7944, 0.850)	(0.4074, 0.4907, 0.6074, 0.6968)	(0.3361, 0.4208, 0.5361, 0.6310)
C ₂₄	(0.5907, 0.6907, 0.7907, 0.8454)	(0.6028, 0.6977, 0.8028, 0.8523)	(0.4065, 0.4921, 0.6065, 0.6968)	(0.3343, 0.4167, 0.5343, 0.6269)
C ₂₅	(0.5880, 0.6880, 0.7880, 0.8509)	(0.5009, 0.5880, 0.7009, 0.7727)	(0.3852, 0.4676, 0.5852, 0.6778)	(0.3806, 0.4662, 0.5806, 0.6699)
C ₃₁	(0.6315, 0.7301, 0.8315, 0.8838)	(0.5157, 0.6120, 0.7157, 0.7926)	(0.1750, 0.2273, 0.3750, 0.4718)	(0.3972, 0.4713, 0.5972, 0.6699)
C ₃₂	(0.6417, 0.7370, 0.8417, 0.8875)	(0.5880, 0.6843, 0.7880, 0.8509)	(0.1481, 0.1944, 0.3481, 0.4458)	(0.3778, 0.4481, 0.5778, 0.6514)
C ₃₃	(0.5972, 0.6972, 0.7972, 0.8532)	(0.4870, 0.5843, 0.6870, 0.7685)	(0.2389, 0.2986, 0.4389, 0.5333)	(0.4824, 0.5671, 0.6824, 0.7463)
C ₄₁	(0.5463, 0.6458, 0.7463, 0.8264)	(0.4426, 0.5384, 0.6426, 0.7394)	(0.3509, 0.4236, 0.5509, 0.6356)	(0.4991, 0.5856, 0.6991, 0.7616)
C ₄₂	(0.5046, 0.6009, 0.7046, 0.7898)	(0.4444, 0.5421, 0.6444, 0.7407)	(0.3380, 0.4079, 0.5380, 0.6208)	(0.5176, 0.6060, 0.7176, 0.7759)
C ₄₃	(0.5583, 0.6560, 0.7583, 0.8296)	(0.4926, 0.5921, 0.6926, 0.7782)	(0.3167, 0.3847, 0.5167, 0.6028)	(0.5167, 0.6064, 0.7167, 0.7759)
C ₄₄	(0.4759, 0.5718, 0.6759, 0.7634)	(0.4352, 0.5315, 0.6352, 0.7296)	(0.3241, 0.3935, 0.5241, 0.6083)	(0.5426, 0.6310, 0.7426, 0.7944)

GSLPs in Taiwan, based on the proposed fuzzy MCDM algorithm.

DISCUSSION

This paper aims to develop a fuzzy MCDM algorithm to evaluate service strategies of CV for GSLPs based on the shippers’ perspective in Taiwan. Since evaluating service strategies of CV for GSLPs is important; hence, an empirical study based on the shippers’ perspective in Taiwan is surveyed by using a proposed fuzzy MCDM approach.

At first, we introduce some theoretical concepts and methods, which mainly include fuzzy set theory, trapezoidal fuzzy numbers, algebraic operations of fuzzy numbers, linguistic values, and

the GMIR method, respectively. Subsequently, a systematical fuzzy MCDM algorithm is proposed. The proposed algorithm includes three steps; that is development of hierarchical structure, computation of aggregating evaluation ratings of all feasible alternatives, and choice of optimal alternative, respectively. Finally, the systematic approach is to perform the empirical survey via questionnaires.

By using the proposed fuzzy MCDM algorithm, the result shows customization of services, ranking one, is the most suitable service strategy of CV for GSLPs. Differentiation, and providing long-term product values are ranked in the second and third places. The service strategy of service operation and delivery system is the lowest ranked. Overall speaking, the suitable service strategy of customization should be paid more attention by

the GSLPs.

To be a good third-party logistics service provider for shippers and GSCs will not be a headache anymore; in case of execution of customization strategy can be provided high CV for GSLPs. In our empirical study, the result shows that customizing shipper’s own products/services is the most suitable strategy to have uniquely differentiated competence. No matter what the shippers are looking for any logistics services, the GSLPs provide the total solutions based on the customization services is the most critical matter. Customization can definitely make shippers magnificent to beat their competitors in this field, and finally to outlive in the industry. Customization may provide the superior services to support customers to outlast and remain. The reason why the business of GSLPs can be facilitated is to give

Table 3. The aggregation appropriateness ratings.

R_{it}	Fuzzy ratings	R_{it}	Fuzzy ratings
R_{A_11}	(0.1161, 0.1355, 0.1561, 0.1692)	R_{A_31}	(0.0921, 0.1098, 0.1321, 0.1488)
R_{A_12}	(0.1161, 0.1361, 0.1561, 0.1688)	R_{A_32}	(0.0813, 0.0981, 0.1213, 0.1391)
R_{A_13}	(0.2098, 0.2423, 0.2764, 0.2933)	R_{A_33}	(0.0587, 0.0759, 0.1254, 0.1576)
R_{A_14}	(0.1303, 0.1547, 0.1803, 0.2007)	R_{A_34}	(0.0835, 0.1010, 0.1335, 0.1546)
R_{A_21}	(0.1114, 0.1307, 0.1514, 0.1649)	R_{A_41}	(0.1052, 0.1237, 0.1452, 0.1597)
R_{A_22}	(0.1153, 0.1343, 0.1553, 0.1670)	R_{A_42}	(0.0699, 0.0867, 0.1099, 0.1286)
R_{A_23}	(0.1791, 0.2113, 0.2458, 0.270)	R_{A_43}	(0.1350, 0.1598, 0.2016, 0.2255)
R_{A_24}	(0.1129, 0.1372, 0.1629, 0.1863)	R_{A_44}	(0.1295, 0.1515, 0.1795, 0.1941)

Table 4. Final aggregation ratings and ranking value of four alternatives.

Alternatives	F_i	Ranking value	Ranking order
A_1	(0.0351, 0.0410, 0.0471, 0.0510)	0.0437	1
A_2	(0.0320, 0.0378, 0.0441, 0.0484)	0.0407	2
A_3	(0.0199, 0.0242, 0.0319, 0.0373)	0.0282	4
A_4	(0.0267, 0.0317, 0.0387, 0.0432)	0.0351	3

what the customization can be provided in the future. All the customized products/services make the GSLPs different from others. Just like the ocean carrier of Wan Hai Lines guarantees her service philosophy, "We Carry, We Care." With the GSLPs, customers' concerns are their primary concerns too. Hence, what makes the difference and dissimilitude? The customization of service strategy of CV for GSLPs may be a good explanatory statement.

Besides, the customization of service strategy should be executed; therefore, the differentiation, providing long-term product values, and service operation and delivery system can be hereby appeared and performed. Furthermore, to re-consider the resources allocation, evaluating value-added activities for GSLPs can be studied by using this fuzzy MCDM algorithm in the future studies.

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Full Length Research Paper

The relationships among governance and earnings management: An empirical study on non-profit hospitals in Taiwan

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Sequel to the fact that the financial information of non-profit proprietary hospitals in Taiwan has been called into question, the Department of Health, Executive Yuan, (2006/2) has established guidelines regarding the financial reports of medical juridical person, stipulating that these reports must be audited by a certified public accountant (CPA) to show that reported earnings are representative. However, non-profit proprietary hospitals still employ numerous measures to transfer hospital profits to individuals or corporate groups, indicating that earnings figures do not necessarily reflect operational performance. Previous studies have focused on researching earnings management behavior in non-profit hospitals in the UK and the U.S.; however, the operational system and environment of hospitals in Taiwan are significantly different from the cases studied and cannot therefore be considered equivalent. This study used non-profit proprietary hospitals in Taiwan and ordinary least square method to test our hypothesis about earnings management behavior. The empirical results show that CEO duality (CEO serving as chairman) negatively relates to earnings management. However, information transparency and social responsibility insignificantly relate to earnings management. On the other hand, discretionary accruals play an active role in earnings management.

Key words: Not profit hospital, earnings management.

INTRODUCTION

Healy and Wahlen (1999) define earnings management as managers use of judgment in financial reporting and in structuring transactions to alter financial reports either to mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers. Earnings management has been labeled probably the most important ethical issue facing the accounting profession (Merchant and Rockness, 1994). Parfet (2000) notes that management has a portfolio of good or ethical; and bad or unethical earnings management practices from which to choose. Ethical earnings management practices would include, for risks (an example, using derivative securities to hedge business important business purpose). Unethical earnings management practices include accrual management (that

is, artificially shifting expenses between periods) to cosmetically smooth earnings (Parfet, 2000). Another form of earnings management is earnings smoothing (Dechow and Skinner, 2000), which can be defined as the process of manipulating the time profile of earnings to make the reported income stream less variable (Fudenberg and Tirole, 1995). Bhattacharya et al. (2003) also identify earnings aggressiveness, loss avoidance, and earnings smoothing are commonly used methods that contribute to earnings management. In additions, earnings management can be accomplished through many different means, such as modifying the lives of depreciable assets, changing the estimate of how much of accounts receivables will be uncollectible, or altering the estimate of the amount of warranties that will be exercised on the company's products (Huang et al., 2008). Managers can also understate earnings to make reported earnings appear less volatile than the firm's actual fundamental performance (Huang et al., 2008)

Much of this research has focused on determining

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whether earnings management exists and identifying the incentives to manage earnings (Healy and Whalen, 1999). For example, managers' equity incentives (Cheng and Warfield, 2005), acquire the capital needed (Gaud et al., 2007; Iatridis and Kadorinis, 2009; Douppnik, 2008), ensure the distribution of dividends in years of poor performance (Buckmaster, 2001).

Iatridis and Kadorinis (2009), Schonfeld (1998) examine the earnings management inclination of firms that seek to meet or exceed financial analysts' forecasts. Iatridis and Kadorinis (2009) also finding generally indicate that firms with low profitability and high leverage measures are likely to use earnings management. In addition, firms that are close to debt covenant violation also appear to be inclined to employ earnings management practices. Likewise, firms tend to use earnings management to improve their financial numbers and subsequently reinforce their compensation.

On the other hands, research also has begun to examine the ability of corporate governance and other institutional factors or law to constrain earnings management (Chung et al., 2002; Krishnan, 2003; Haw et al., 2004). Burgstahler et al. (2006) also find earnings management to be more prevalent in countries with weak legal enforcement systems.

The globalization of health services is reflected in the emergence of new forms of organization for health care in the last decade and increased cross-border delivery of health services through the movement of goods and services (Vargas-Hernandez and Noruzi, 2010). A global restructuring in the health sector due to high costs of medical services, particularly in developed countries has resulted in the creation of an international market of care and health care (Vargas-Hernandez and Noruzi, 2010). Hospital structures in different countries vary owing to operational environment in diverse operations strategies or mainly historical factors (Braam Rust and Johan de Jager, 2010).

Based on ownership, Taiwan hospitals can be divided into three categories, public hospitals, proprietary hospitals, and private hospitals. Public hospitals do not aim to make profits. Proprietary hospitals are a kind of private hospital, and do not pursue profits either. Private hospitals, on the other hand, are mainly for making profits. In terms of judging their efficiency or level of performance, hospitals can be categorized into three major categories; medical centers, regional hospitals, and local hospitals. Medical centers are large-scale hospitals mainly responsible for education, research, training, and highly complicated medical treatments; regional hospitals are medium-sized hospitals responsible for education, training, and complicated medical treatments; local hospitals are small-scaled hospitals mainly for training and ordinary medical treatments (Ching, 2007).

According to Taiwan's medical law, public hospitals managed by the government or public enterprise or universities, non-profit hospitals established by private

universities or donations for purposes of charity or medical research, and proprietary hospitals owned by physicians (hereafter termed for profits hospitals). Investor-owned corporations are prohibited from owning hospitals in Taiwan. In spite of this institutional difference, FP (for profit) hospitals in Taiwan are distinguished from non-profit hospitals by a variety of legal and economic aspects similar to the distinctions in the United States. First and the foremost, FP hospitals are managed and controlled by physician(s) who own the organization and its profits. By comparison, NFP (not for profit) hospitals do not have owners, but have self-perpetuating boards that have control rights. Therefore, a NFP hospital is legally forbidden from distributing its net earnings, if any, to its board of directors, administrators, doctors, or anyone else. Second, owners of FP hospitals have to pay personal income tax from net earnings. By contrast, NFP hospitals pay corporate income tax only if less than 80% of net earnings are not spent on purposes specified in the charter. Even in that case, the rate of personal income tax is much higher than that of corporate income tax. Third, NFP hospitals also are exempt from land and property taxes. Finally, NFP hospitals are entitled to receive charitable contributions. Most NFP hospitals were initially established through large charitable donations, while most FP hospitals were initially established through non-tax exempt personal debt.

On March 1, 1995, Taiwan introduced a National Health Insurance to cover all citizens in the country. Since it was compulsory, the insured rate was as high as 90%. The Bureau of National Health Insurance is the authority responsible for the implementation and management of the system. For the public, the implementation of National Health Insurance reduces most of their burden in medical costs. However, from the hospital's point of view, the system has a negative impact on revenues since fees originally paid by patients are transferred to the insurer, as the third party. In an earlier stage before the system was implemented, hospitals collected revenues through a service fee, making it possible for them to increase revenues by offering more services. However, doing this resulted in an escalation of medical costs, since they were unable to increase premiums to keep up with the increased services, for political reasons. Statistics from the Bureau of National Health Insurance reveal an 'embarrassing' situation of the hospitals not being able to make ends meet when the premium's annual growth was 4.26%, given that the increase in their medical costs was as high as 6.26% over the same period. In order to prevent the National Health Insurance Scheme leading to a deterioration in the finances of the hospitals, the Bureau of National Health Insurance introduced different methods of payment, and implemented National Budgeting System on July 1, 2002 hoping that the new budgeting method would be capable of focusing or restricting the medical services provided as well as controlling the rate of increase in medical costs (Ching,

2007). However, most of non-profit hospitals (especially medical centers or institution-owned Hospitals) have positive net income and even more than other industries were.

It is a serious puzzle. One possible explanation for this result is for this result is because more of non-profit hospitals in the Taiwan suffered the lack of financial transparency, such as related party transactions (for example, the sales of goods or services from related-party, the purchases of goods from related-party) or equipment depreciation too fast, and, drug price, donated revenue, subsidy revenue, sales commission, earnings management.

The goal of non-profit hospitals is not to create profit, but interested parties or stakeholders (creditors, communities, responsible authorities, donors, and third-person related parties) use earnings to evaluate hospital performance nonetheless (Leone and van Horn, 2005). Therefore, various inducements, such as maintaining the balance between profit and loss (Ballantine et al., 2007; Leone and van Horn, 2005; Ballantine et al., 2008; Eldenburg et al., 2008; Eldenburg et al., 2004), assurance of organizational position (Brickley and van Horn, 2002), budget constraints (Hoerger, 1991), donations (Frank et al., 1990), or saving on taxes (Leone and van Horn, 2005; Frank and Salkever, 1994) may lead hospital managers to manipulate earnings.

This paper examines the motives for Taiwan NFP hospitals that engage in earnings management activities with the hope of offering some insights for government.

LITERATURE REVIEW

CEO serving as chairman

In agency theory, by allowing the Chairman to act as CEO, the board of directors would lose its supervisory influence on managers, (Boyd, 1994; Core et al., 1999), and independence, (Fama and Jensen, 1983; Cadbury Committee, 1992).

This leads to degraded internal management mechanisms and high degree of earnings management (Beasley 1996; Klein 2002; Zhao and Chen, 2008). Non-profit hospitals are different from those in for-profit organizations.

According to Medical Treatment Act 33, the Chairman is the primary person in charge. In practice, the CEO is the top -level of manager.

H₁: CEO duality has a positive correlation with earnings management

Transparency

Information transparency affects the way managers manipulate earnings (Hirst and Hopkins, 1998). Lower transparency allows for an increase in hidden earnings

manipulation (Hunton et al., 2006), while more available information can limit opportunities to manipulate earnings significantly (Hirst and Hopkins, 1998). Because of the lack of personal benefits, most managers are often not willing to conduct earnings management (Lobo and Zhou, 2001).

H₂: Financial transparency has a significant negative relationship with earnings management

H₃: Non-financial transparency has a significant negative relationship with earnings management

Socially responsible

Socially Responsible (SR) is related to ethical and moral issues concerning corporate decision-making and behavior and, as such, addresses complex issues like, local community relations (Castelo and Lima, 2006) or by advancing the goals of community organizations (McWilliams et al., 2006). Disclosure of information about outcomes regarding social responsibility may help build a positive image among stakeholders (Orlitzky et al., 2003). On the other hands, SR activities are a powerful tool for obtaining support from stakeholders. With this tactic, the manager will reduce the likelihood of being fired due to pressure from discontented stakeholders whose interests have been damaged by the implementation of earnings management practices (Cespa and Cestone, 2007). Thus, this behavior associated with the negative relationship between socially responsible and earnings management (Chih et al., 2008).

H₄: Socially Responsible has a significant negative relationship with earnings management

METHODOLOGY

Sample data

The sample of this study was obtained from the Department of Health, Executive Yuan, or non-profit proprietary hospital's website (included 42 hospitals) between 2005 and 2008 (Sample=98).

Empirical model

The study used the ordinary least squares (OLS) method. The general model used to determine which factors influence the earnings management. The proxy variables are as follows:

Dependent variable: Measuring discretionary accruals

Discretionary accruals (DA_{it}): DA represents that part of total accruals that is more susceptible to manipulation by managers and are frequently used in prior studies as a proxy for earnings management (Chung et al., 2005; Leone and Van Horn, 2005; Kothari et al., 2005). Where, the absolute value of ϵ_t to measure

earnings management were adopted.

$DA1_{it}$:

$$\frac{TAC_{it}}{TA_{i,t-1}} = \alpha_0 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_1 \left[\frac{\Delta REV_{it} - \Delta AR_{it}}{TA_{i,t-1}} \right] + \alpha_2 \left(\frac{PPE_{it}}{TA_{i,t-1}} \right) + \varepsilon_i \quad (1)$$

$DA2_{it}$:

$$\frac{\Delta BAD_{it}}{TA_{i,t-1}} = \alpha_0 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_1 \left[\frac{\Delta NETREV_{it}}{TA_{i,t-1}} \right] + \varepsilon_i \quad (2)$$

$DA3_{it}$:

$$\frac{TAC_{it}}{TA_{i,t-1}} = \alpha_0 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_1 \left[\frac{\Delta REV_{it}}{TA_{i,t-1}} \right] + \alpha_2 ROA_{i,t-1} + \varepsilon_i \quad (3)$$

Where, $TA_{i,t-1}$ is assets measured as at time t-1.

TAC_{it} = (Δ current assets minus Δ cash) minus (Δ current liabilities minus Δ Short-term loans minus Δ tax payable) minus depreciation; Δ is measured as the difference between at time t and at time t-1. Thus, ΔREV_{it} is total revenue (inpatient and outpatient revenue) measured as the difference between at time t and at time t-1; ΔAR_{it} is accounts receivable measured as the difference between at time t and at time t-1; PPE_{it} is net of accumulated fixed assets measured as at time t; ΔBAD_{it} is bad debt measured as the difference between at time t and at time t-1; $\Delta NETREV_{it}$ is net revenue measured as the difference between at time t and at time t-1; $ROA_{i,t-1}$ is return of assets measured as at time t-1.

Independent variables

CEO duality (CEO_{it}) is Chairman served as CEO in NFP hospitals at time t measured in a dummy variable. A dummy variable with a value of 1 if the Chairman served as CEO and 0 otherwise. Financial transparency (FT_{it}) and Non financial transparency (NFT_{it}) are at time t measured in Appendix A. Socially Responsible (SR_{it}) is at time t measured in Medical Treatment Act 46.

Control variable

The study defines the following proxy variables are as follows. $DEBT_{it}$ is the proportion of debt at time t measured in liabilities divided by assets $\times 100\%$ (Cao, 2010). OCF_{it} is operating cash flow measured as at time t. $AUDIT_{it}$ is a certified professional accountant firm at time t measured in a dummy variable. A dummy variable with a value of 1 if a Big 4 audits firm and 0 otherwise. NA_{it} is net asset at time t measured in assets minus liabilities.

RESULTS AND ANALYSES

Descriptive statistics

According to the descriptive statistics analysis in Table 1, the mean of discretionary accruals is significant (T-test), showing that not profit hospitals in Taiwan have higher degree of earnings manipulation. On the other hand, financial transparency is 19.5 points and non financial transparency is 17.6 points. Financial transparency is higher. Socially responsible (10% of net patient revenue) is 11.52%, which complies with the law. The proportion of debt at 22.35% shows it to be financial conservative. Net assets show that not profit hospitals in Taiwan are 248.98 (U.S. million dollars). Operating cash flows show that non-profit hospitals in Taiwan are profitable and doing well.

Empirical test

The empirical results in Tables 2, 3, and 4 show the link between CEO duality and earnings management of non-profit hospitals in Taiwan is negative. The reason is that CEO in non-profit hospital is often hired externally by the board of directors. This increases the independence and power of superintendants and limits the degree to which the boards of directors control earnings. The hypothesis 1 is not supported.

Currently, transparency and earnings management have an insignificant relationship (Alam, 2009). The hypotheses 2 and 3 are unsupported. This shows that many unclear issues concerning hospital information transparency still exist, and information that has already been disclosed (including non-financial transparency) has put pressure on hospitals. Actions to limit earnings management are unclear. We show the link between social responsibility and earnings management of non-profit hospitals in Taiwan is insignificant. The hypothesis 4 remains unsupported. Socially responsible non-profit hospitals in Taiwan focus on community treatment, education, research. If the ratio were close to 10%, it would indicate that manager's compliance with the law and not be a control mechanism for hospital's stakeholders. Thus, the study have been unable to conclusion whether stakeholders have put pressure on hospitals and detected earnings management.

More importantly, from Table 6, it is seen that DA2 is a more powerful method for explaining the relationships between governance with earnings management. It also shows that DA2 is a better index to explain earnings management for Taiwan NFP hospitals.

Results from variance inflation factors to explain fifteen variables for correlation; the result lies between 1.026 and 1.099. There is no correlation problem. In order to avoid possible bias from extreme values, the study also adopt those samples only include the sample data of

Table 1. Descriptive statistics for variables (US dollars in millions, %, points) (N =98).

	Max.	Average	Min.	P-value
$DA1_{it}$	0.936	0.794	0.652	0.000
$DA2_{it}$	1.025	0.977	0.784	0.000
$DA3_{it}$	0.574	0.468	0.356	0.000
FT_{it}	23	19.5	17	0.015
NFT_{it}	18	17.6	15	0.027
SR_{it}	13.6%	11.52%	10.08%	0.072
$DEBT_{it}$	36.72%	22.35%	17.58%	0.058
OCF_{it}	20.74	7.51	1.83	0.036
NA_{it}	687.61	248.98	60.61	0.019

$DA1_{it}$ 、 $DA2_{it}$ 、 $DA3_{it}$ are discretionary accruals; FT_{it} is financial transparency NFT_{it} is non- financial transparency; SR_{it} is Socially Responsible; $DEBT_{it}$ is the proportion of debt ; OCF_{it} is operating cash flow; NA_{it} is net asset.

Table 2. Regression results explaining DA1.

	Dependent variable ($TAC_{it}/TA_{i,t-1}$)
$1/TA_{i,t-1}$	0.205***
$\frac{\Delta REV_{it} - \Delta AR_{it}}{TA_{i,t-1}}$	0.081**
$\frac{PPE_{it}}{TA_{i,t-1}}$	-0.111***
adj- R^2	0.358
F-value	258.693

$$TAC_{it}/TA_{i,t-1} = \alpha_0 (1/TA_{i,t-1}) + \alpha_1 \left[\frac{\Delta REV_{it} - \Delta AR_{it}}{TA_{i,t-1}} \right] + \alpha_2 \left(\frac{PPE_{it}}{TA_{i,t-1}} \right) + \varepsilon_t.$$

TAC_{it} = (Δ current assets minus Δ cash) minus (Δ current liabilities minus Δ Short-term loans minus Δ tax payable) minus depreciation; $TA_{i,t-1}$ is assets measured as at time t-1; ΔREV_{it} is total revenue (inpatient and outpatient revenue) measured as the difference between at time t and at time t-1; ΔAR_{it} is accounts receivable measured as the difference between at time t and at time t-1; PPE_{it} is net of accumulated fixed assets measured as at time t; *:p<0.1、 **: p<0.05、 ***: P<0.01

from the 5th percentile to the 95th percentile as measures for the robustness test, the results show that most of

Table 3. Regression results explaining DA2.

Dependent variable $\Delta (BAD_{it} / TA_{i,t-1})$	
$1/TA_{i,t-1}$	-0.135**
$\frac{\Delta NETREV_{it}}{TA_{i,t-1}}$	-0.222***
adj- R^2	0.415
F-value	317.256

$$\Delta BAD_{it} / TA_{i,t-1} = \alpha_0 (1/TA_{i,t-1}) + \alpha_1 [\frac{\Delta NETREV_{it}}{TA_{i,t-1}}] + \epsilon_t$$

ΔBAD_{it} is bad debt measured as the difference between at time t and at time t-1; $TA_{i,t-1}$ is assets measured as at time t-1. $\Delta NETREV_{it}$ is net revenue measured as the difference between at time t and at time t-1; *, **; p<0.1, **: p<0.05, ***: P<0.01.

Table 4. Regression results explaining DA3.

Dependent variable $(TAC_{it} / TA_{i,t-1})$	
$1/TA_{i,t-1}$	0.225***
$\frac{\Delta REV_{it}}{TA_{i,t-1}}$	0.072**
$ROA_{i,t-1}$	0.116***
adj- R^2	0.386
F-value	299.527

$$TAC_{it} / TA_{i,t-1} = \alpha_0 (1/TA_{i,t-1}) + \alpha_1 [\frac{\Delta REV_{it}}{TA_{i,t-1}}] + \alpha_2 ROA_{i,t-1} + \epsilon_t$$

TAC_{it} = (Δ current assets minus Δ cash) minus (Δ current liabilities minus Δ Short-term loans minus Δ tax payable) minus depreciation; $TA_{i,t-1}$ is assets measured as at time t-1. ΔREV_{it} is total revenue (inpatient and outpatient revenue) measured as the difference between at time t and at time t-1; $ROA_{i,t-1}$ is return of assets measured as at time t-1. *, **; p<0.1, **: p<0.05, ***: P<0.01.

them are consistent with Tables 5, 6, and 7.

Conclusion

The purpose of this paper is to examine whether earnings management in the not for profit hospitals of Taiwan and analyze the earnings management behavior. The sample spans from 2005 to 2007. Non-profit hospitals have different goals, management, and manager enticement. All of which lead to differences in financial reports. Studies on earnings management are focus on for profit organizations (Bartov et al., 2000; Klein 2002; Byard et

al., 2007; Siregar and Utama, 2008). However, hospital studies are rare (Leone and Van Horn, 2005; Hoerger, 1991; Frank et al., 1990; Ballantine et al., 2007).

Research indicated that CEO duality had a negative correlation with earnings management. The CEO of non-profit hospitals has a higher degree of independence and supervisory power, thus limiting the influence of board of directors on earnings manipulation. The relationship between transparency and earnings management is still unclear; indicating the Taiwan Department of Health Executive Yuan (DOH) must adopt stricter systems to make internal information more public and such findings

Table 5. Regressions of governance with earnings management (Dependent variable is $DA1_{it}$).

Dependent variable ($DA1_{it}$).						
Intercept	0.311***	0.447***	0.457***	0.515***	0.461***	0.439***
CEO_{it}	-0.325***	-0.375***	-0.321***	-0.329***	-0.358***	0.331***
FT_{it}	0.007	-0.008	0.007	0.011	0.017	0.012
NFT_{it}	-0.025	-0.015	-0.019	-0.017	-0.029	-0.019
SR_{it}	0.004	0.036	0.027	0.019	0.012	0.013
$DEBT_{it}$		0.137**	0.122**	0.126**	0.174***	0.131**
OCF_{it}			-0.158***	-0.152***	-0.136**	-0.132***
$AUDIT_{it}$				0.051	0.027	-0.036
NA_{it}					-0.018	0.014
adj- R^2	0.125	0.137	0.147	0.145	0.152	0.149
F-value	31.121***	24.985***	21.031***	22.301***	19.527***	19.847***

(1). $DA1_{it}$ is discretionary accruals 2. CEO duality (CEO_{it}) is Chairman served as CEO in NFP hospitals at time t measured in a dummy variable. A dummy variable with a value of 1 if the Chairman served as CEO, and 0 otherwise. Financial transparency (FT_{it}) and Non financial transparency (NFT_{it}) are at time t measured in Appendix A. Socially Responsible (SR_{it}) is at time t measured in Medical Treatment Act 46. $DEBT_{it}$ is the proportion of debt at time t measured in liabilities divided by assets $\times 100\%$. OCF_{it} is operating cash flow measured as at time t. $AUDIT_{it}$ is a certified professional accountant firm at time t measured in a dummy variable. A dummy variable with a value of 1 if a Big 4 audits firm and 0 otherwise. NA_{it} is net asset at time t measured in assets minus liabilities. (3). *: $p < 0.1$, **: $p < 0.05$, ***: $P < 0.01$, $N = 98$

Table 6. Regressions of governance with earnings management (Dependent variable is $DA2_{it}$).

Dependent variable $DA2_{it}$						
intercept	0.411***	0.374***	0.357***	0.451***	0.417***	0.539***
CEO_{it}	-0.425***	-0.475***	-0.421***	-0.432***	-0.458***	0.531***
FT_{it}	0.001	-0.004	0.005	0.017	0.016	0.018
NFT_{it}	-0.027	-0.016	-0.024	-0.027	-0.034	-0.028
SR_{it}	0.014	0.047	0.057	0.024	0.032	0.043
$DEBT_{it}$		0.213**	0.142**	0.156**	0.177***	0.143**
OCF_{it}			-0.188***	-0.172***	-0.156**	-0.173***
$AUDIT_{it}$.039	0.037	-0.047
NA_{it}					-0.025	0.024
adj- R^2	0.212	0.237	0.247	0.245	0.252	0.249
F-value	29.457***	23.188***	20.058***	21.581***	22.197***	24.328***
N				98		

(1). $DA2_{it}$ is discretionary accruals (2). CEO duality (CEO_{it}) is Chairman served as CEO in NFP hospitals at time t measured in a dummy variable. A dummy variable with a value of 1 if the Chairman served as CEO, and 0 otherwise. Financial transparency (FT_{it}) and Non financial transparency (NFT_{it}) are at time t measured in Appendix A. Socially Responsible (SR_{it}) is at time t measured in Medical Treatment Act 46. $DEBT_{it}$ is the proportion of debt at time t measured in liabilities divided by assets $\times 100\%$. OCF_{it} is operating cash flow measured as at time t. $AUDIT_{it}$ is a certified professional accountant firm at time t measured in a dummy variable. A dummy variable with a value of 1 if a Big 4 audit firm and 0 otherwise. NA_{it} is net asset at time t measured in assets minus liabilities.

3.*: $p < 0.1$, **: $p < 0.05$, ***: $P < 0.01$,

Table 7. Regressions of governance with earnings management (Dependent variable is $DA3_{it}$).

	Dependent variable ($DA3_{it}$)					
intercept	0.275***	0.274***	0.237***	0.311***	0.314***	0.495***
CEO_{it}	-0.342***	-0.375***	-0.341***	-0.442***	-0.348***	0.455***
FT_{it}	0.004	-0.002	0.004	0.011	0.017	0.014
NFT_{it}	-0.021	-0.015	-0.021	-0.027	-0.029	-0.024
SR_{it}	0.011	0.041	0.051	0.021	0.022	0.027
$DEBT_{it}$		0.203**	0.112**	0.146**	0.157***	0.149**
OCF_{it}			-0.171***	-0.154***	-0.146**	-0.158***
$AUDIT_{it}$				0.027	0.031	-0.027
NA_{it}					-0.017	0.021
adj- R^2	0.195	0.198	0.214	0.199	0.202	0.217
F-value	27.357***	22.114***	19.125***	20.365***	21.036***	22.181***
N			98			

(1). $DA3_{it}$ is discretionary accruals (2). CEO_{it} is Chairman served as CEO in NFP hospitals at time t measured in a dummy variable. A dummy variable with a value of 1 if the Chairman served as CEO and 0 otherwise. Financial transparency (FT_{it}) and Non financial transparency (NFT_{it}) are at time t measured in Appendix A. Socially Responsible (SR_{it}) is at time t measured in Medical Treatment Act 46. $DEBT_{it}$ is the proportion of debt at time t measured in liabilities divided by assets $\times 100\%$. OCF_{it} is operating cash flow measured as at time t. $AUDIT_{it}$ is a certified professional accountant firm at time t measured in a dummy variable. A dummy variable with a value of 1 if a Big 4 audit firm and 0 otherwise. NA_{it} is net asset at time t measured in assets minus liabilities. (3).*: $p < 0.1$, **: $p < 0.05$, ***: $P < 0.01$

also found in case of education in Bangladesh that is non-profit based business (Alam et al., 2010a, 2010b). Because of the special environment, non-profit hospitals in Taiwan often make complex. Most of non-profit hospitals (especially medical centers or institution-owned Hospitals) have positive net income and even more than other industries were. The Department of Health, Executive Yuan, Taiwan (DOH) adopts the so-called revenue-increased system. It leads to burden citizen's insurance costs. It is a serious puzzle. Earnings management and the source of revenue for hospitals are possible reasons for this, as well as the possibility of an unbalanced insurance system. The study also suggest that future studies examine the impact factors of earning management in other kinds of hospitals, because different hospitals have different organizational structures or cultural and industry characters. In addition, other elements such as market competition and the compensation of directors and Supervisors must be considered. Subsequent research should keep track of these trends and analyze the degree of earnings manipulation. Thus, the research will cover a complete study of earnings management in not for profit hospitals.

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Full Length Research Paper

A literature review on technology road-mapping: A case of power-line communication

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Technology road-mapping (TRM) has become an important issue and has received increasing interest from both academics industry and business sectors. TRM is a powerful and flexible tool widely used in industry. Its principle use is to provide support in the form of strategic management and long-term planning of products or services for future development. The main purpose of this paper is to provide an analytical-review update for the issue of TRM. A case study of power-line communication (PLC) is used by implementing a technology roadmap process based on a data analysis. The studied results indicate the projected PLC trend of Thailand to be in the two areas of technology and market developments. The former indicates smart technological innovations. The latter, however, is not fully developed because broadband power-line communication has an influence only on a specific market. This situation shows that PLC is still playing a role only in some areas, due to business complexity.

Key words: Technology road-mapping, technology forecasting, literature review, technological innovation, power-line communication.

INTRODUCTION

Currently, technology road-mapping (TRM) development is applied to several technological development plans, both in company and industry-level organizations (Groenveld, 1997). The primary objective of TRM development concerns integration between business strategy and technology development (Kostoff and Schaller, 2001; Phaal et al., 2002), establishing a direction that is common to both business strategy and technology strategy, and the superiority of a more-efficient technological development for use by an organization. Moreover, TRM is aimed right at the future of technology planning and can be expected to serve as a tool of significant technology-development prediction, with a suitable reservation for the future. Thus, TRM functions as an extremely useful device for technology management and

industrial policy planning with indications for reliable procedures in future technology planning, and may even be utilized to lead strategy policy and operation levels, as well. In addition, the TRM project provides a considerably useful tool for correction and allocation of time, and its uses extend even to priority management.

According to the literature review, TRM is integrated with various organizations and industries. Yet, this literature review does not consider TRM action on power-line communication (PLC). Rather, this paper presents a literature-review update of TRM and the limitations of especially TRM integration, and then builds TRM in a case study of PLC. In addition, the advantage of PLC is on cable-data communication through transmission lines, an outstanding feature allowing internet connection speeds up to 45 Mbps (27 Mbps downstream and 18 Mbps upstream) (Fink and Rho Jae, 2008). As compared with broadband internet service in Thailand, with speeds limited to 8 Mbps, these speeds are faster than the

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current broadband capability. The primary advantage of PLC is that it offers a developed technology integrated communication data with electric-cable of the low-voltage electricity system. Additionally, PLC is easily set up at low cost and shows potential as a tool for high-speed broadband internet connection to every outlet in each household. Private sector and the government have both shown a definite interest in this technology. Meanwhile, the national telecommunications commission (NTC) of Thailand allows the provision of these services.

The creative-procedure portion of the TRM conceptual thinking approach to be developed for PLC in Thailand subdivides into 2 sections: the PLC-related products and service-provider technology. Furthermore, the authors interrelate TRM design to services/capability planning, as this type offers a larger suitability for service-based enterprises which focus on the ways in which technology supports organizational capabilities. This study requires a 5-year period from 2010 to 2014, inclusively. The first section is to follow the development of emerging technologies responsible to the progressive of PLC technology-development tracking. In particular, it will approve technologies and PLC technology strategic planning, estimation or upgrading. This section determines the best way to create new PLC technology strategies to support emerging technologies, and the degree to which PLC technology ability development is needed in order to follow these new technologies. The second section emphasizes the PLC development that is related to products and service-provider technology. In addition, this section will follow the current progress of the involved products and technologies in their tracking, inspection and strategy development and, at the same time, study their marketing feedback in order to conform marketing adaptation and technology strategy to ongoing market trends.

Results from the TRM power-line communication case study, which analyzed the correspondence of PLC technology as it changed through time during the last 5 years, shows that the wireless-technology solution played a significant role during this last period. Meanwhile, the low-voltage distribution cable continues to be used in technology access. The summary indicates that the future challenge of PLC in Thailand includes technology and market developments. Also, the PLC technology involves some highly interesting innovations. The PLC, for instance, has an ability to support connection devices such as Home Control and Home PNA. Because of its ability to support connection devices of these types, the technology clearly offers several competitive advantages. Accordingly, the overall image of PLC technology lies in the highly interesting techno-innovations. The market, however, is not fully grown because broadband power-line communication (BPLC) has an influence only on a part of the market. This limitation in the market results from internet-provider marketing factors. PLC continues nonetheless to play a role in some areas because of the

prevailing business complexity.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Overview of TRM

Currently, this new technology development integrates technology road-mapping (TRM) together with technological considerations for enhancement of productivity and improvement of efficiency to meet business goals. A former Motorola chairman and advocate of science and technology roadmaps, Robert Galvin, remarked that technology road-mapping (in its beginning stages) had been utilized since the 1970's. "A roadmap," in Galvin's own words is "A road map is an extended look at the future of a chosen field of inquiry composed from the collective knowledge and imagination of the brightest drivers of the change in that field" (Galvin, 1998). Among the various roadmap types are national technology roadmaps, (Diebold, 1995; Spencer and Seidel, 1995) particularly industrial technology roadmaps (Ning, 1995) and international technology roadmap (Schaller, 2001). These roadmap communication activities include a vehicle-communication methodology to advise certain designated roadmap participants. They also resolve any problems that may occur during the process of vehicle arrangement, such as durational set-up. These functions accomplish the essential purpose of these activities, and the focus of this paper is directed toward their successful execution.

Usage of TRM

Of interest here are TRM usage specifications from various technology roadmap providers and experimenters. The directional technology roadmap, which was first introduced and demonstrated by (EIRMA, 1997; Koen, 1997), is shown in Figure 1, together with TRM usage specifications. In addition to the general roadmap, Figure 1 also shows a time-based chart, which includes a number of commercial and technological aspects. Together, they enable the development of products and technologies. Further, they even enable markets.

TRM: A technological parallelism

As Figure 4 illustrates, technology road-mapping spatially delineates or maps out the various phases of product innovation along an optimal path from product concept to product distribution. TRM integrates the various aspects of technology, business and practical production toward an optimum quality and output level of the final product in

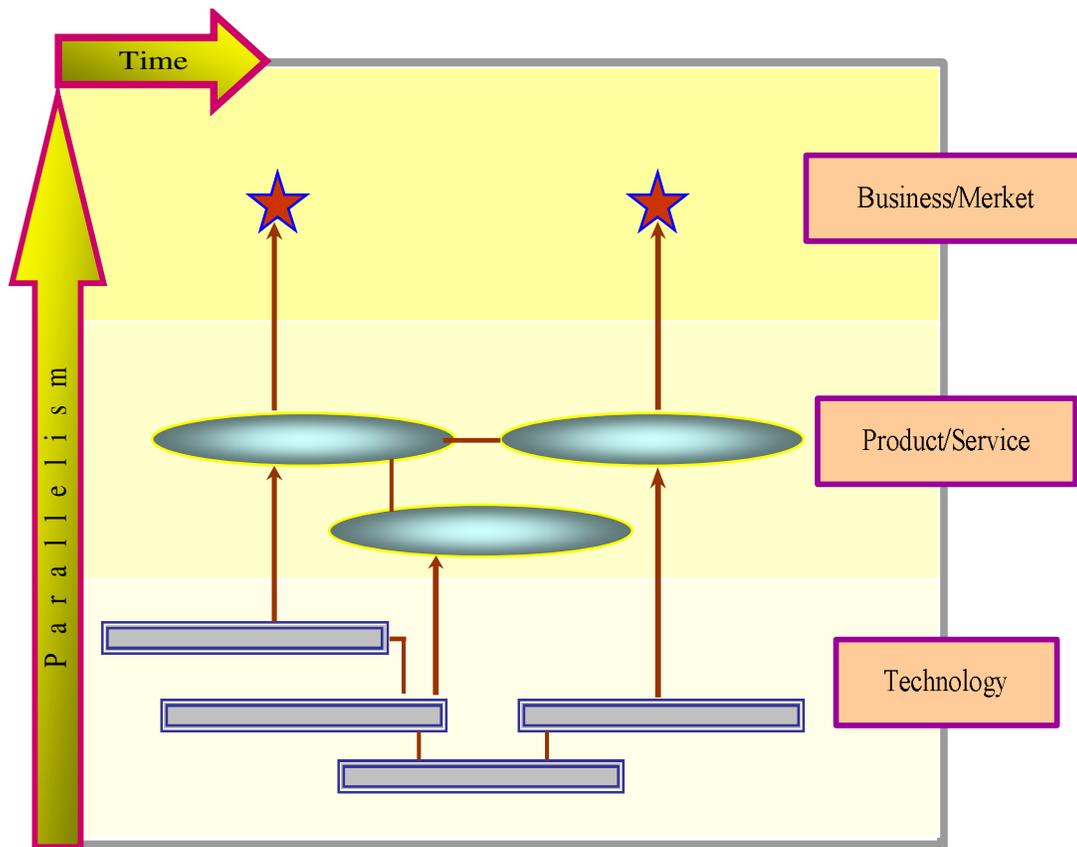


Figure 1. Technology roadmap: basic schematic.

the most cost-effective manner. Thus, technology roadmapping, as a technology parallelism, effectively does parallel the entire product-development process. Stated otherwise, TRM is itself a parallelism to the technology it assists. Accordingly, research and development aspects of the entire design process, together with the more pragmatic aspects of the production process, are optimized with respect to both the physical processes themselves and the relative timing of their activities.

TRM: methodology

The method of road-mapping consists of time usage in connection with dimension gathering for a technology strategy structure. Once the overall characterization of technology roadmaps had been described, the structural pattern of exploring and communicating the relationships among markets, products and technologies evolved and developed into an easier implementing tool (Phaal et al., 2001, 2002, 2004). They showed that the road-mapping method was the primary factor in organizational troubleshooting by means of organizational environment scanning, individual performance tracking and future-

vision-oriented research integrated with various technological tools. Additional roadmaps tools were provided by Kostoff (2006), Lee and Park (2005). They provided a method of virtual innovation which they supported with (1) a roadmap technology especially suited to innovation factories, (2) knowledge of evolutionary technological patterns capable of incorporation with roadmap technology for innovation and (3) market-limitation opportunities that discover and provide methods of self-organization simulation and possibility. Geisler (2002) likewise introduced an important component for technological estimation to assist an organization in its reach toward a future target. Eugenio et al., (2006) introduced an integration of strategic planning, roadmap technology and intelligent technology. Furthermore, Newman and Leverhantz (2001) introduced utilization of roadmaps for technological identification and position. Also, Kappel (2001) Albright and Kappel (2003) and Groenveld (1997) added an additional focus on roadmap-technology integration with strategic planning tools.

Also, the energy sector is now using technology roadmaps. A review of the hydrogen-futures literature was provided by McDowall and Eames (2006), showing how utilized scenarios, roadmaps and similar foresight

methods cope with uncertainty in areas with long planning horizons, such as energy policy. Moreover, research into the future prospects of hydrogen energy indicates that the trend will continue. Use of these methods leads to powerful expectations of emerging

Types of TRM

The technological approach to road-mapping can be adopted in various ways according to the aims of the organizations and the sphere of graphical representation that roadmaps can represent. Product, innovation, business and strategic road mapping are terms that are applicable to a number of uses. One example is that of Phaal et al. (2001) who inspected a proximate grouping of 40 technology roadmaps extending into 16 broad areas (Figure 2(a) to 2(h)), as described in more detail in the following sections.

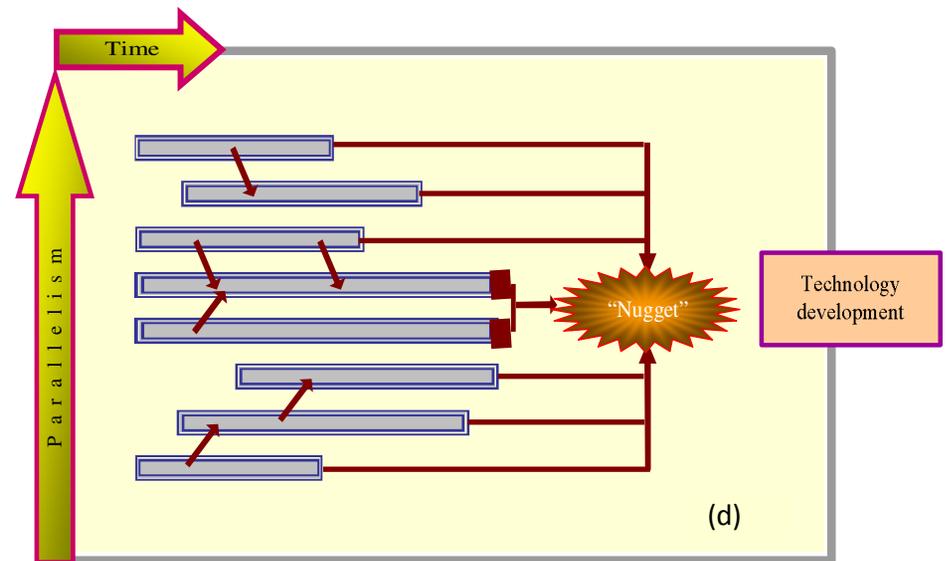
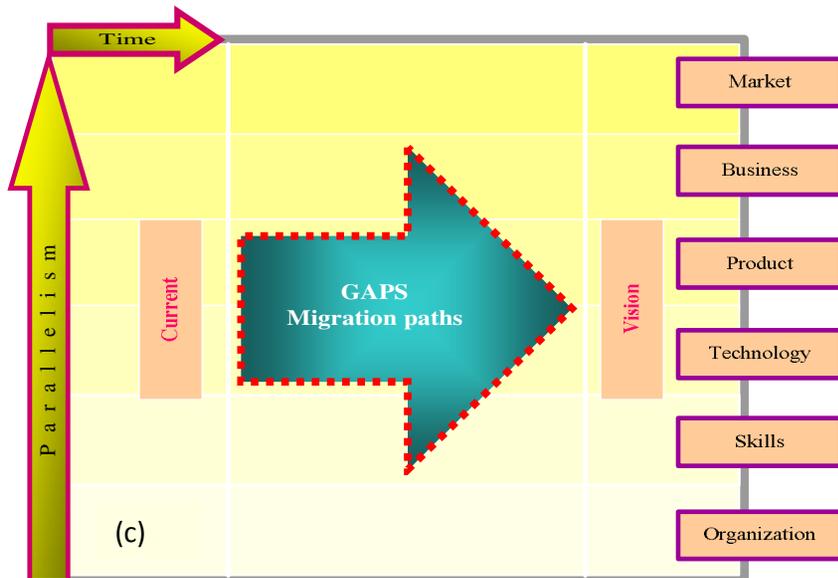
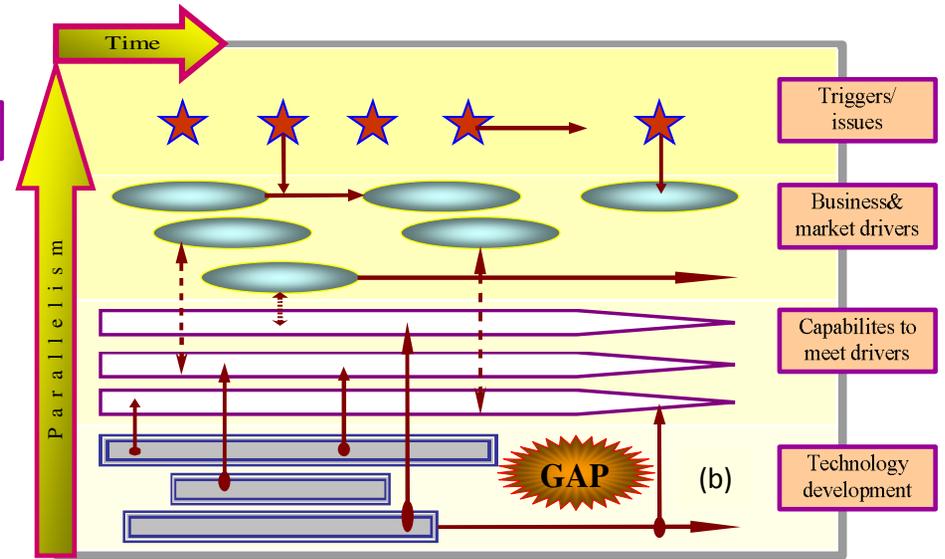
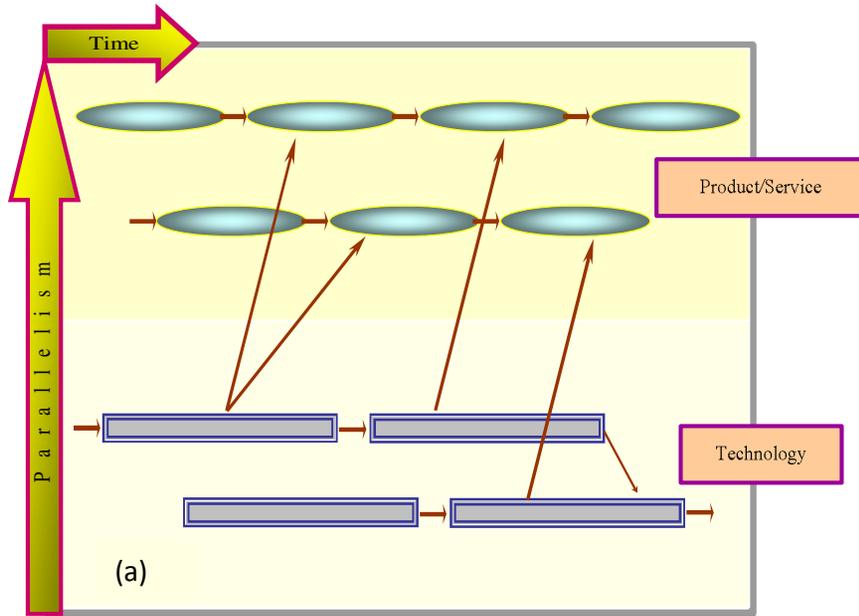
Moreover, in a 1998 TRM workshop, more than a dozen varying applications of roadmaps were presented. These groups observed structure and content to demonstrate intended purpose and graphical format. These are generally classifiable into four groups: 1) science and technology roadmaps, 2) corporate/product-technology roadmaps, 3) industry technology roadmaps and 4) product/portfolio management roadmaps. Each is classified, respectively, according to their applications and objectives (Albright and Schaller, 1998). Lastly, Kappel presents a road mapping taxonomy based on road-mapping purpose and roadmap emphasis.

As a result, a large number of roadmaps are subdivided into four groups. These are, namely, science technology roadmap, product technology roadmaps, industry roadmaps, and product roadmaps (Kappel, 2001). One can draw a taxonomic representation illustrating his objective. Kappel presents a road-mapping taxonomy based on concepts of road-mapping purpose and road-mapping emphasis. Some form of introduction can be deduced from this writing. For example, the clarification and reliability of roadmap types or categories can be sorted to appear feasible. Approximately at least a dozen different applications of roadmaps were presented at the technology roadmap workshop in 1998 (Foster, 1985). These applications cover a wide spectrum of usage, as in the following examples: potential technologies and the resources necessary for their realization, all of which combines to perform an important role in the development of a shared future vision. They used a six-fold typology to map out the state of scenario construction, expectations and exploration, and to provide for questions pertaining to the future of hydrogen. However, Bruckner et al. (2005) also provided an example of roadmaps, exhibiting the distribution of energy technologies for public policy; and Hower (2004) provided a clean-coal technologies roadmap.

Technology roadmaps are also used in various areas, as in these examples. Yasemin and Ibahar (2007) successfully utilized roadmaps for technology integration in schools. Holmes and Ferrill (2007) and Ferrill (2006) applied technology road-mapping to assist the Singaporean SMEs in emerging technology identification and selection. Walsh et al. (2005) extracted a semiconductor silicon industry roadmap which focused on epochs driven by the dynamics between disruptive technologies and core capabilities.

Kostoff et al. (2004), Linton (2004), Vojak and Chambers (2004), Galvin (2004) and Walsh (2004) promoted an awareness of road-mapping disruptive technologies. Walsh (2004) also studied into road-mapping as a disruptive technology and focused on the case study of the emerging micro-systems and top-down nano-systems industry. His study involved theoretical utility investigation and practice for traditional technology road-mapping tools in an international industrial road mapping effort. He focused firstly on micro-technology and top-down nanotechnology, and then on modifying the traditional technology road-mapping approaches to generating a model for an industrial worldwide disruptive-technology road-mapping process. Fleischer et al. (2005) likewise investigated the emerging technologies estimation, focusing on nanotechnologies. Roadmaps are effectively used in product development and a group of studies were focused in this area. Petrick and Echols (2004) investigated technology road-mapping for decision improvement in new-product development. Bray and Garcia (1997) similarly focused on strategic and technology planning integration for competitiveness. However, Bucher and Jung (2001) also provided an implementation from Asea Brown Boveri (ABB) Limited and Passey et al. (2006), who studied the procedure of integration in product-concept vision and scenario structure with roadmaps. Lee et al (2006), Sungjoo et al. (2006) utilized patent information for new product development by a keyword-based technology road-mapping approach. Yasunaga and Yoon (2004) studied utilization of technology road-mapping with knowledge structure in R&D management.

1. Science or research roadmaps, e.g., science mapping;
2. Crossed-industry roadmaps, e.g., the Industry Canada initiative;
3. Industry roadmaps, e.g., the SIA's International Technology Roadmap for Semiconductors;
4. Technology roadmaps applicable to aerospace, aluminum and other such areas;
5. Product roadmaps like those of Motorola and Intel, among others;
6. Product-technology roadmaps like Lucent Technologies and Philips International;
7. Project/issue roadmaps such as are used for project administration.



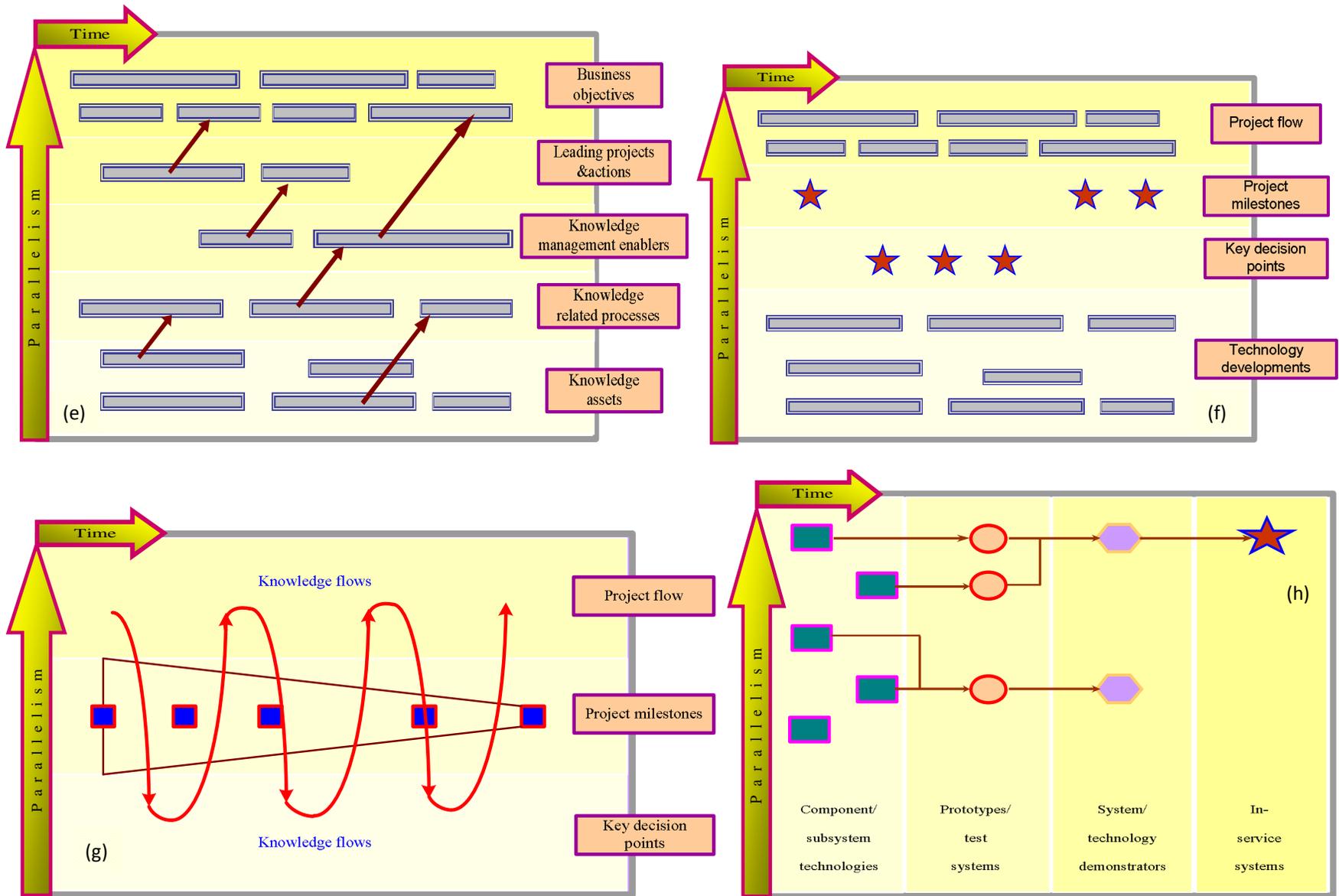


Figure 2(a). Technology roadmaps: basic types and applications(a)(Product planning). (b) Service/ Capability planning. (c) Strategic planning.(d) Long range planning. (e) Knowledge asset planning (f) Program planning (g) Process planning. (h) Integration planning.

From this diversity of usage, a taxonomy is proposed in an attempt to classify roadmaps for the visualization of their locations in applications.

TRM software use

Software has an important role to perform in enterprise road-mapping application support (Duckles and Coyle, 2002), as does, for instance, the Vision Strategist software for strategic-planning collaboration. Vision Strategist™ is the first and only centralized product-planning software for business-development plans and objectives across the enterprise. It offers an uncommon solution allowing organizational users to automate the strategic-planning process and to visualize alternatives selection for breakthrough product opportunities. Additionally, Vision Strategist™ directly assists the perceptions of decision-makers regarding their company's future direction by the use of roadmaps, which are time-based information representations that support a specification objective or decision process. The advantages of TRM software consist mostly of the following features:

1. Increase in new revenue by revitalizing innovation and identifying new opportunities;
2. Cost reduction by maximizing reuse and reducing redundant technology development;
3. Better alignment and synchronization across functions and organizations;
4. Improvement of an organization's agility by creating a strategic plan that reacts to market changes in real time;
5. Accountability and ownership in maintaining each individual's role in the overall strategy and communication of those responsibilities to others;
6. Expansion to meet a diversity of additional necessary components with suitability of corresponding applications and modules.

Nevertheless, software alone cannot deliver good roadmaps. It must, instead, be integrated with the human aspects of road-mapping, as well. Accordingly, a main benefit of TRM will lie in the expansion of knowledge and the furthering of a shared vision of the company's future. This benefit will materialize only in the sharing of knowledge and making connections.

Benefits of TRM

A principal key advantage of the process is the organization-wide communication support that takes place during the development and expansion of the roadmap. This method is especially effective for synthesizing varying perspectives, deriving, as one case in point, a balance of commercial and technological functions.

In addition, road-mapping is also able to support the following activities:

1. Expediting the new resource integration such as novel technologies;
2. Identifying potential opportunities and threats;
3. Supporting high-level planning and control;
4. Emphasizing understanding or close knowledge gaps;
5. Providing support for decision making, resource allocation and risk management.

A CASE STUDY OF POWER-LINE COMMUNICATION (PLC)

Background of PLC technology

Power-line communication (PLC) (Jee et al., 2003; Weilin et al., 2003) is a technology enabling utility companies to deploy a communications network over existing power-line infrastructures by the transmission of data signals through the same power cables that transmit electricity. Besides, all types of home cable, whether low-voltage (110-220 volts) or medium-voltage (1,000-40,000 volts) distribution cable, function as PLC. Power-line communication is occasionally referenced by different names like, for example, broadband over power line (BPL) and power-line telecommunications (PLT). Moreover, many sources tend to describe and detail it in different terms. In this paper, this technological concept will be designated as power-line communication (PLC). PLC is a technology employing an electrical supply network to support data transfer and includes both the narrowband PLC and electric-power control in a public utility. Narrowband PLC, for example, extends to electrical equipment control and home security, while electric-power control may apply to power-supply activation through a switch-gear process control, automation meter reading (AMR) and tariff broadcast. The power utility provider starts to develop this technology by using high-voltage distribution line communication and controls between substations. Currently, it is capable of high-speed data transfer (broadband PLC), such as high-speed internet, video streaming and VoIP, through low-voltage distribution cables. For this reason, its development can proceed over an access network, instead of a telephone line.

Power-line communication began shortly after electrical power supply became widespread. Carrier frequency systems began to operate over high-tension lines in frequency levels of 15 to 500 kHz for telemetric objectives and continued operation from approximately the year 1922. Various consumer products, such as baby-alarm systems, have been available for dedicated consumer usage at least since 1940 (Dostert, 1997). In addition, from the 1930s (Broadridge, 1984), ripple-carrier signaling became accessible in the level of low-voltage

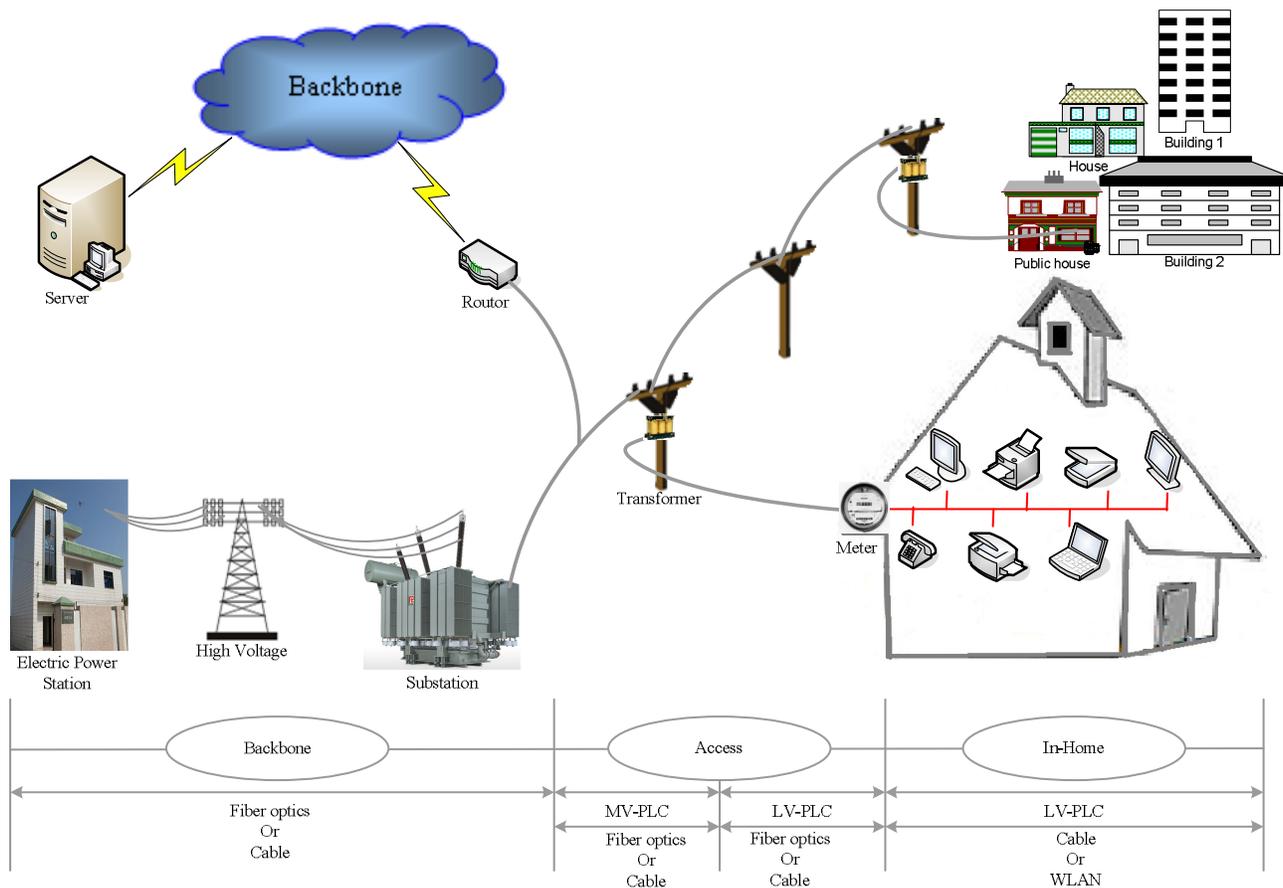


Figure 3. A power-line communication (PLC) network: general flow diagram.

(240/415V) and medium-voltage (10 to 20 KV) distribution systems. The challenge of this operation lies in the field of bi-directional technology. For example, Tokyo Electric Power Co., the largest of Tokyo's electric-power companies, began its experiments in the 1970's and eventually reported success in many hundreds of units after experimentation ended. From mid-1980 (Hosono et al., 1982), interest grew in the potential value of digital-signal processing. Communication usage techniques have since increased with the application of concepts that can be implemented at low cost. These concepts have been applied to the production of systems which are capable of being widely installed, allowing them to compete well with wireless solutions. However, the communications channel of the narrowband power line presents numerous technical challenges.

There are 4 main supplies of systems to PLC networks, namely: 1) devices utilizing DS2 chip sets, 2) devices utilizing Intellon chip sets, 3) devices utilizing Xeline chip sets and 4) devices utilizing Panasonic chip sets. Most recently, because PLC devices use different chipsets, they have been unable to communicate with each other

in PLC networks, though steps are now being taken to standardize the process by chip vendors and project groups. The creation of a "Draft Standard for Broadband over Power Line Networks: Medium-Access Control and Physical-Layer Specifications" by the IEEE P1901 working group (IEEE P, 1901) attempts to do so. Medium voltage (MV) PLC and low voltage (LV) PLC are divisible by PLC as shown in Figure 3. The MV PLC uses a 22.9 kV power line between the substation and the transformer, while the LV PLC uses a 110V / 220V power line in common with the transformer and household power line. The PLC network comprises various PLC devices, among which are master modems, slave modem, repeater modem and MV/LV gateway (Lee et al., 2006). A specified device is used to connect network backbone, like the fiber network, xDSL, as well as a cable network to the PLC network through a master modem. In addition, a repeater modem is a device used to signal amplification between various PLC devices, and a slave modem is a device used for signal-transfer between PLC network and home devices like the PC. A MV/LV gateway mediates between MV, PLC and LV PLC. However, the PLC

networks remain under management by the PLC Operation Center by way of the internet connection.

Business of PLC

The PLC requires comparatively less expense than an internet network, since the transmission system requires a smaller investment. Because of its low expense, PLC technology is becoming popular. In general, the business plan always estimates the capital in PLC system planning below the actual required outlay. The PLC system should be of a fit design, so that, at the beginning of the plan, the expert designer may come to a reliable expense evaluation for the system in its current design state. Ultimately, the people who succeed in the PLC business will not be the public-utility service supporters, but the telecommunication planners and those who operate the internet services.

Consequently, the cost of installing all the equipment in homes and in buildings, designated here as customer promise equipment (CPE), is a critical factor in the PLC business. However, the CPE cost is continually and incrementally decreasing and will soon reach the point at which it will compete with other technologies, such as DSL or Wi-Fi Access Point.

Design-technology road-mapping of PLC

The creative-procedure portion of the TRM conceptual thinking approach to be developed for PLC in Thailand subdivides into 2 sections: the PLC-related products and service-provider technology. Furthermore, the authors interrelate TRM design to services/capability planning, as this type offers a larger suitability for service-based enterprises which focus on the ways in which technology supports organizational capabilities. This study requires a 5-year period from 2010 to 2014, inclusively. Figure 2(b) shows a Royal Mail roadmap, based on an initial T-Plan application (Brown and Phaal, 2001), used to investigate the impact of technology developments on business. This roadmap focuses on organizational capabilities as the bridge between products and service-provider technology. Consideration of these factors over the 5-year period from 2010 to 2014 will involve the following points:

1. The first section is to follow the development of emerging technologies responsible for the furthering of progress in PLC technology-development tracking. In particular, it will approve technologies and PLC strategic planning, estimation or upgrading. This section determines the best way to create new PLC technology strategies to support newly emerging technologies, and the degree to which the ability development within the PLC is going to be needed in order to follow these new

technologies.

2. The second section emphasizes the PLC development that is related to products and service-provider technology. In addition, this section will follow the current progress of the involved products and technologies in their tracking, inspection and strategy development and, at the same time, study their marketing feedback in order to adapt and conform marketing and technology strategy to current and projected trends.

Through the TRM conceptual thinking approach, PLC can be related to products and service-provider technology. From the results derived from consideration of the TRM of power-line communication case study, the authors have created a TRM of PLC at different points in time during the previous 5 years. They have analyzed the patterns of PLC technology change during the period 2010 to 2014 and divided the TRM structure into 4 main factors. These factors comprise access, product, technology and time, and are related to each other in the manner shown in Figure 4.

The power-line communication (PLC) technology has evolved from the narrowband offerings into a broadband pipe known as broadband power-line communication (BPLC). BPLC has two primary applications: broadband access (BPLC-Access) and home networking (BPLC-Indoor). The TRM of the power-line communication case study served to analyze patterns of PLC technology change at various times during the 5-year period under consideration. From Figure 4, the results derived from consideration of the case study shows that the wireless-technology solution had a role during that last period, and that the low-voltage distribution cable continues to be used in technology access. A summary indication of the PLC trend for Thailand's future reveals 2 aspects. These are the technology and market developments, as shown below:

Technology: PLC technology has a highly interesting role to play in deriving solutions for the development of access technologies. Moreover, PLC technology has the capacity to support connecting devices like Home Control, Home Networking, Utility Application, Wire Broadband and Internet Access. Also, BPLC-Access offers higher data rates than other widely-available competing alternatives, such as DSL and cable modem. Similarly, BPLC-Indoor competes well against other home networking technologies, such as Wi-Fi and HomePNA, and offers several competitive advantages, as well. Consequently, PLC technology in its overall image offers, as an added advantage, several competitive advantages and stands clearly as one of the most highly interesting of techno-innovations;

Market developments: As Jeong et al. (2008) show, BPLC can be expected to occupy only a small portion of

Technology Roadmapping of Power Line Communication

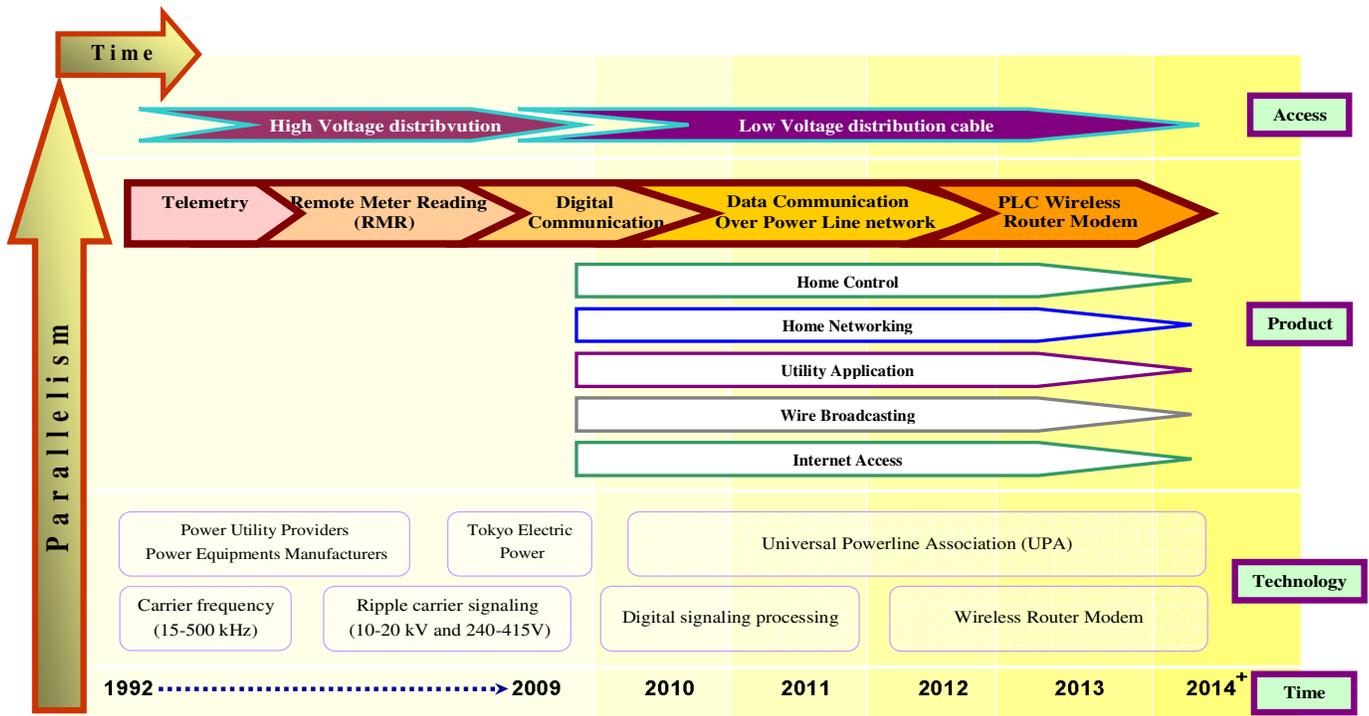


Figure 4. Technology road-mapping may be utilized for the digital capture of their development to maximize production efficiency.

Korea’s internet-access market in the future because of internet-provider marketing factors. Their report details global BPLC deployments, examines emerging BPLC devices, discusses standards and regulation and profiles major vendors marketing BPLC equipment. Their report also examines developments in BPLC technologies, compares these technologies with other competing solutions and provides market sizing and market forecasts for both BPLC-Access and BPLC-Indoor. The report indicates that PLC cannot be dominant in all areas in a competitive market because of the complexity of modern business. Hence, the PLC market is in need of further growth.

DISCUSSION

Experimentation in the area of technology road-mapping is primarily directed toward the use of TRM as a practical technology-planning tool within an increasingly competitive environment, as in the application of TRM to the approximation operation (Gerdri et al., 2008) of SCG Building Materials Co., Ltd. This utility results from the practical support of technology road-mapping for multiple technologies and development coordination of multiple projects. This coordination is critical when treating the issue of technologies that are related to the core

capabilities of an organization. Nonetheless, careful consideration of alternative technologies and organizational necessity will be of greater importance than merely following a precise process format. The result of this study points to the successful appropriation of a technology road-mapping process that will, in time, be of value. This technology, however, still needs to be corroborated by a reputable organization and cannot be guaranteed as valid except by verifiably reproducible results.

In this paper, the authors have presented an overview of technology road-mapping, lending particular attention to the case study of TRM of PLC, in which they analyze the pattern of PLC technology change over time. As discussed above, a 5-year period is required for the case-study analysis. Further, the PLC trend for the future can be viewed from 2 aspects. The first aspect is technology. PLC technology is remarkably interesting to follow in its development as an access-technology solution. PLC is also capable, in addition, of supporting the connected device and satisfying multi-function requirements. The PLC technology is, accordingly, among the most interesting of techno-innovations. The other aspect lies in market developments. According to the current data, BPLC has an influence only on a part of the market because of internet-provider marketing factors. This

situation forces the realization that PLC is still playing only a limited role in some areas because of business complexity. The PLC market is, therefore, less than fully grown.

Work is expected to continue on technology road-mapping of PLC. Likewise, research on the similar communication technologies will continue with comparisons of the progress being made in each of the technologies. In general, effective use can be made of a software tool like Geneva Vision Strategist or any other such tool for designing technology road-mapping. As work continues, future reports will provide updates on its progress by using these tools in creating technology road-mapping, which, while fairly simple in design, saves time in development. This methodology differentiates the technology and very vividly highlights comparative strengths that exist within the technology.

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Full Length Research Paper

Competitive strategy orientation in Egypt and Peru

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There is a dearth of empirical studies that examine the link between competitive strategy and organizational performance in developing nations. This paper addresses this gap by assessing the strategy-performance nexus in two disparate emerging economies, Egypt and Peru. Findings support the cost leadership, differentiation, and focus conceptualizations of business strategy in both nations, but no single "best strategy" can be generalized. Focus businesses in Peru appeared to grow at a faster pace than businesses without a niche orientation, but a similar relationship was not found in Egypt. Avenues for future research are discussed, including the need for replications in other African and Latin American nations.

Key words: Peru, Egypt, strategy, competitive strategy, emerging nations.

INTRODUCTION

Differences in competitive strategy orientation are often identified when comparing and contrasting organizations in more and less developed nations (Ghobadian and O'Regan, 2006; London and Hart, 2004; Phambuka-Nsimbi, 2008; Ralston et al., 2008; Zhang et al., 2007 and Zhou et al., 2006). However, much of what is known about competitive strategies and performance is based on studies of Western firms in developed nations. While some of these findings may be generalizable, differences in external factors—including cultural, political, economic, and competitive forces—challenge the validity of commonly accepted notions of strategy in emerging nations (Rousaki and Alcott, 2006).

The quantity and quality of published work investigating managerial conceptualizations of business strategy in developing nations is limited (Beneke, 2010; Groznik and Maslaric, 2010). Specifically, scholars continue to refine the understanding of the strategy-performance relationship, but relatively few studies examine the existence of a linkage in emerging countries (Majocchi and Zucchella, 2003; Pang et al., 2006; Wongtada and Rice, 2008).

The present study considers the strategy-performance nexus in Egypt and Peru. These nations were selected for investigation for several reasons. First, there are key similarities between the two, as both countries represent emerging economies with rich cultural heritages. Second, there are also marked geographical, religious, and cultural differences between Egypt and Peru that contribute to nuanced conceptualizations of competitive strategy

(Parnell, 2008). Finally, assessing these two countries can help fill the gap that exists in extant strategy-performance work in emerging economies (Phambuka-Nsimbi, 2008).

LITERATURE REVIEW

The current understanding of the competitive strategy-firm performance relationship can be traced to the Industrial organization (IO) framework of industry behavior. IO emphasized characteristics of the industry as the primary determinants of organizational performance (Barney, 1986). Scholars challenged IO's inability to explain large performance variances within an industry (Ghemawat, 2002). Case studies emphasized organization-level behaviors associated with performance that were not readily explained by industry-level analyses, but often at the expense of generalizability.

The strategic group level of analysis was introduced as a compromise between the industry level of analysis inherent in IO and the firm level addressed in case studies (Hergert, 1983; Porter, 1981). Strategic groups represent clusters of businesses that exhibit relatively homogeneous strategic behavior within a heterogeneous industry. Generic business strategy typologies identifying feasible generic strategies were proposed and linked to organizational performance (Porter, 1980; Hashim, 2000).

Typologies proposed three decades ago became the theoretical basis for identifying strategic groups in industries. Miles and Snow's (1978) approach identified three workable competitive strategy alternatives: prospector, analyzer, and defender, and a fourth poor performing alternative, the reactor. Research has generally supported the validity of the Miles and Snow typology (DeSarbo et al., 2005; Parnell and Wright, 1993; Parnell, 2000).

Porter's (1985) generic strategy typology suggested that a business can achieve success through low cost leadership or differentiation of its products or services. Organizations adopting either approach could emphasize the entire market or focus on a single niche. Porter (1980) suggested that a business attempting to combine cost leadership and differentiation tends to perform poorly because the low cost and differentiation strategies are based on incompatible assumptions and necessary trade-offs. This idea initially received considerable support, but has been challenged by scholarly research arguing that a combination approach may promote synergies that can overcome any tradeoffs that may be involved (Parnell, 1997; Parnell and Wright, 1993; Wright, 1987).

Hypotheses

Most strategy-performance studies have considered firms in developed nations (Coombs and Holladay, 2007). There is a dearth of previous published work linking strategic orientation emerging nations like Egypt and Peru. Extant literature in the competitive strategy realm is sufficient for developing and testing three hypotheses in these two countries.

Research has supported clear distinctions among Porter's (1980) cost leadership, differentiation, and focus strategies, primarily in developed nations but also in emerging economies. Moreover, scholarly work has identified an overarching positive association between each of these strategic orientations and business performance (Parnell and Koseoglu, 2009). Similar findings are anticipated in Egypt and Peru, and some degree of support for this foundational hypothesis lends validity to testing the other hypotheses.

H₁: Cost leadership, differentiation, and focus strategies will be positively associated with performance in (1a) Egypt and (1b) Peru.

Business environments in Egypt and Peru share similarities and differences. Egypt has a rich cultural and commercial tradition, but its present business and management practices lag behind most Western nations (Magd, 2008). Western foreign investment and joint ventures with Egyptian firms have increased considerably in recent decades. Attitudes toward strategic planning in

Egypt are essentially positive, in both manufacturing and service organizations (Elbanna, 2007), and in small and medium sized enterprises (SMEs) as well (Kazem and van der Heijden, 2006).

Peru also has a rich and diverse heritage (Metcalf et al., 2008). Its economy consists of a subsistence sector and a modern one most prominent in the capital, Lima (EIU, 2003). Recent trends have been noted in Peru in favor of greater management interaction, greater decentralization of decision-making, and more participative leadership styles (Buchenrieder and Heuft, 2003; Sully de Luque and Arbazia, 2005). Management tendencies are difficult to delineate, however, because of substantial differences across geographical regions, firms and Industries (Bieber and Mukhtyar, 1999; Jackle and Li, 2006). Formal management practices became prevalent only in the last decade and are not widely in small organizations outside of Lima (Sully de Luque and Arbazia, 2005). Most firms in Lima are small as well, and are managed much differently when compared to their larger counterparts (MTPE, 2003).

Labor costs in both nations are lower than in developed Western economies. Firms in developing nations typically enjoy a comparative advantage in production costs when compared to their counterparts in the developed world (Hashim, 2000; Jusoh and Parnell, 2008; London and Hart, 2004). As such, it is expected that the most profitable firms will leverage this advantage by pursuing a cost leadership strategy.

H₂: Business organizations pursuing a cost leadership strategy will report greater profitability than those pursuing a differentiation strategy in (2a) Egypt and (2b) Peru.

Capital and other resources tend to be limited in developing nations (Hashim, 2000; London and Hart, 2004; Thukral et al., 2008). Management in nations like Egypt and Peru is highly dependent on government allocation of resources (Amsden, 1989; Steinberg, 1989). Management practice cannot be explained solely in terms of individual firm conduct, but must also include the role of the nation-state (Braham, 1994; Ring et al., 1990). As a result, successful firms tend to concentrate their efforts on one or two market niches rather than attempt to serve the entire market.

H₃: Business organizations pursuing a focus strategy will report greater growth than will their counterparts without a focus orientation in (3a) Egypt and (3b) Peru.

METHODOLOGY

Research in developing nations can present a number of logistical challenges for scholars. Although sound research encourages one to maintain methodological consistency, approaches to primary

Table 1. Strategy and performance Items*

Strategy items
Minimize Production Costs
Minimize Distribution Costs
Production Quotas
Differentiation
New Products
Uniqueness
Market Breadth
Wide Product Width
Marketing Emphasis
Competitor Emphasis
Risk-taking
Performance items (Ramanujam and Venkatraman, 1987)
Sales Growth
Profit Growth
Market Share
Return on Assets (ROA)
Return on Equity (ROE)
Return on Sales (ROS)
Overall Firm Performance
Competitive Position

* A five-point Likert scale was employed.

data collection common in developed nations often must be modified to fit the distinctive cultural attributes of the country in which the research takes place. Punnett and Shenkar (1994) warned against interviews, experiments and observational approaches where great religious differences exist between the researcher's home culture and that being studied. Survey research in nations like Egypt and Peru is feasible when any language barriers are overcome, but less reliable when educational differences are also highly pronounced (Adler, 1983; Hatem, 1994; Hutchings et al., 2010). These challenges were considered in the present research design, specifically in the measurement of the two key constructs, business strategy and performance.

Strategic emphasis was assessed via Likert-oriented items based on Miles and Snow's (1978) and Porter's (1985) typologies. Eleven items addressed such areas of the minimization of production or distribution costs, emphasis on new products, and new product development. A complete list of the strategy items is provided in Table 1.

Measuring organizational performance always represents a challenge in strategy-performance studies, as measurement choices can influence findings and conclusions (Cavaliere et al., 2007; Jusoh and Parnell, 2008; Pongatchat and Johnston, 2008). Although some studies utilize quantitative performance measures, a qualitative approach can assess subjective areas of performance such as the satisfaction of managers, customers and other stakeholders, and even ethical behavior. Utilizing qualitative measures provides insight into organizational processes and outcomes that are not apparent when financial measures are employed (Ayadi et al., 1996; Parnell et al., 2006). A qualitative assessment of performance was utilized in the present study, adopting self-typing scales to assess relative competitive and objective performance from Ramanujam and Venkatraman (1987). A complete list of the performance items is included in table 1. The surveys were independently translated into Spanish for the Peruvian sample by

two bilingual professional: one-academic and one practitioner, who then compared their translations and agreed on final wording for the study. Surveys were sufficiently completed by 247 Peruvian managers, each of which was a participant in a post-graduate management training program in Lima. A variety of manufacturing and service industries were represented.

In Egypt, surveys were sent to the 411 top executive members of the American Chamber of Commerce in Egypt, including primarily U.S. based firms with Egyptian subsidiaries, although some of the companies were owned by firms in third (mostly European) countries. Respondents included top executives of Egypt, the United States, and other nations. Stamped and addressed return envelopes were included with each survey.

Three specific challenges to the research design in Egypt should be identified. First, Egypt's mail system is somewhat reliable, but the extent to which surveys did not reach their intended destination or completed surveys were never returned cannot be accurately assessed. Second, because the survey was sent to executives of non-Egyptian firms, it was not translated into Arabic so as to reduce the possibility that it may be passed along to a subordinate not fluent in English for completion. However, it is possible that some prospective respondents did not complete the survey because of language inadequacy. Finally, the lack of reliable performance data necessitated a reliance on items concerning satisfaction with performance rather than actual profitability or growth. Given the aforementioned obstacles, response rate was relatively strong with 152 executives providing usable surveys within a two-week time period, resulting in 152 usable responses, a 26 % response rate.

RESULTS

Egyptian respondents were considerably older and more

Table 2. Sample demographics.

Characteristic	Egyptian respondents	Peruvian respondents	Composite respondents
Sample size	152	247	399
Mean age	44.8 years	30.2 years	35.8 years
Gender			
Male	99 (65.1%)	117 (45.4%)	216 (54.1%)
Female	53 (34.9%)	130 (52.6%)	183 (45.9%)
Management level			
No level identified	11 (7.2%)	0 (0%)	11 (2.8%)
Low	32 (21.1%)		
Middle	72 (47.4%)		
Top	37 (24.3%)		
Mean experience			
Management	15.6 years	4.8 years	8.9 years
In the present organization	10.6 years	4.4 years	6.8 years

experienced than their Peruvian counterparts, but both samples reflect a cross-section of managers at all three levels (see table 2). The strategy and performance items for each nation were factor analyzed with a varimax rotation. The eleven strategy items in the Egyptian sample produced three eigenvalues over 1 to 3.646, 2.109 and 1.962 accounting for 70.2% of the variance. These three factors reflected strategic emphasis on low cost-differentiation, focus, and marketing/differentiation respectively. The eight performance items also produced three eigenvalues over 1 to 3.132, 1.666 and 1.386 accounting for 77.3% of the variance. These three factors addressed profitability, sales growth, and profit/market growth dimensions of performance. Factor scores were calculated and served as surrogate measures for the strategy dimensions. Factor results for Egypt are presented in Table 3.

Initial results from the Peruvian sample were similar, but not identical to those from the Egyptian sample. The eleven strategy items in the Peruvian sample produced three eigenvalues over 1 to 6.640, 1.275 and 1.021 accounting for 81.2% of the variance. Like the Egyptian sample, these three factors reflected strategic emphasis on low cost-differentiation, focus, and marketing/differentiation respectively. The eight performance items produced two eigenvalues over 1 to 3.584 and 2.935 accounting for 81.5% of the variance (Table 3). These two factors reflected growth and profitability dimensions of performance. Factor results for Peru appear in Table 4.

Results of the hypotheses tests are summarized in Table 5. H_{1a} is supported. Each of the three strategic orientations in Egypt was significantly and positively associated with one of the performance dimensions

(Table 6). The low cost-differentiation strategy was associated with profitability, whereas the focus and marketing/differentiation strategies were associated with profit and market growth.

H_{1b} is supported. Each of the three strategic orientations in Peru was significantly and positively associated with growth, and two were significantly and positively associated with profitability (Table 7).

H_{2a} is partially supported. Only one of the three strategies was significantly associated with the profitability dimension of performance in Egypt (Table 4). Although this is the only strategy that includes a cost leadership emphasis, it is more accurately described as a combination low cost-differentiation approach. Hence, the data did not lend itself to a precise test of the hypothesis, so only partial support is claimed. H_{2b} is also partially supported. Two of the three strategies: low cost-differentiation and marketing/differentiation, were significantly and positively associated with profitability (Table 5). The association with profitability was stronger with the low cost-differentiation strategy. As with the Egyptian sample, however, this is a combination strategy rather than a pure cost leadership approach. Hence, only partial support is claimed. H_{3a} is not supported. Both the focus and marketing/differentiation strategies were significantly and positively associated with profit/marketing growth in Egypt, and none of the strategies was significantly associated with sales growth (Table 4). H_{3b} is supported. Although all three strategies were significantly and positively associated with the growth dimension of performance, the focus strategy association was the strongest (Table 5). Interestingly, it was the only one of the three strategies *not* associated with the profitability dimension.

Table 3. Business strategy and performance scales.

Egypt sample	Factor 1	Factor 2	Factor 3
Strategy	Low cost-diff	Focus	Marketing-Diff
Minimize Production Costs	0.761	0.076	0.182
Minimize Distribution Costs	0.882	-0.035	0.166
Production Quotas	0.761	-0.197	0.047
Differentiation	0.337	-0.015	0.769
New Products	0.822	0.025	0.169
Uniqueness	0.882	-0.084	-0.001
Market Breadth	-0.163	0.886	0.176
Wide Product Width	0.237	0.791	-0.130
Marketing Emphasis	0.072	0.114	0.764
Competitor Emphasis	0.048	0.066	0.787
Risk-taking	-0.227	0.792	0.170
Performance	Profitability	Sales growth	Profit/Market growth
Sales Growth	0.213	0.854	0.143
Profit Growth	0.132	-0.004	0.849
Market Share	-0.111	-0.005	0.848
Return on Assets (ROA)	0.934	0.072	0.043
Return on Equity (ROE)	0.815	0.154	0.053
Return on Sales (ROS)	0.858	0.092	-0.058
Overall Firm Performance	0.598	-0.672	0.192
Competitive Position	0.557	0.647	-0.166

To better understand the composition of the strategic groups and their links to performance in Egypt and Peru, cases were cluster analyzed (Ward's method) on the basis of the three strategy factor scores. Cluster analysis has been employed in a number of strategy-performance studies to classify businesses into strategic groups (Cool and Schendel, 1988; Derajtys et al., 1993); many cluster-based studies found a link between strategic group membership and performance (Dess and Davis, 1984; Katobe and Duhan, 1993). Cluster analysis is especially useful when the precise nature of strategic groups cannot be readily predicted. The optimal number of groups was the largest one whereby no two groups shared a similar strategic orientation and no group contained less than five percent of the cases. Four strategy clusters or strategic groups were identified in Egypt and Peru (Tables 8 and 9).

The strategic groups in each nation and their association with performance were similar, but not identical. In Egypt, the group (cluster 1) pursuing a broad market low cost-differentiation combination strategy reported the highest profitability, but sales growth and profit/market growth were well below the mean. The group (cluster 2) emphasizing the marketing dimension of differentiation did not perform well. There was no clear strategic orientation in the third group, whose members reported relatively strong sales growth but poor profitability and growth in profits and markets. The fourth group includes the high

high performing combination strategy businesses (Wright 1987; Parnell, 1997).

In Peru, only one group (cluster 1) scored high on focus, and this group reported the highest level of overall growth. The low cost-differentiation group (cluster 2) outperformed the others along the profitability dimension. The group (cluster 3) emphasizing only the marketing dimension of differentiation reported performance levels near the mean. The fourth cluster reflects a "stuck in the middle" orientation with low performance across the board (Porter, 1980).

DISCUSSION

Four of the findings warrant additional attention. First, some key similarities across the two developing nations are apparent. Like their counterparts in many other emerging countries, Egyptian and Peruvian firms must function in dynamic political, competitive, and crisis-prone environments (Wang and Xi, 2009). As such, organizations that are flexible and seek to provide differentiated products or services and low costs might be better positioned for success. Interestingly, neither of the factor analyses produced a pure cost leadership approach; low costs were integrated to some extent with differentiation. Hence, the either low costs or differentiation mentality prevalent in many western organizations does not appear

Table 4. Business strategy and performance scales.

Peru sample	Factor 1	Factor 2	Factor 3
	Low cost-diff	Focus	Marketing-Diff
Strategy			
Minimize Production Costs	0.835	0.177	0.300
Minimize Distribution Costs	0.860	0.160	0.177
Production Quotas	0.749	0.422	0.112
Differentiation	0.335	0.249	0.831
New Products	0.797	0.266	0.358
Uniqueness	0.699	0.296	0.243
Market Breadth	0.283	0.889	0.145
Product Line Width	0.248	0.899	0.184
Marketing Emphasis	0.236	0.205	0.890
Competitor Emphasis	0.224	0.794	0.371
Risk-taking	0.599	0.600	0.099
Performance			
	Growth	Profitability	
Sales Growth	0.922	0.238	
Profit Growth	0.931	0.278	
Market Share	0.923	0.168	
Return on Assets (ROA)	0.255	0.926	
Return on Equity (ROE)	0.167	0.931	
Return on Sales (ROS)	0.140	0.927	
Overall Firm Performance	0.525	0.648	
Competitive Position	0.906	0.172	

Table 5. Summary of results.

Hypothesis	Result
H _{1a} : Cost leadership, differentiation, and focus strategies will be positively associated with performance in Egypt	Supported
H _{1b} : Cost leadership, differentiation, and focus strategies will be positively associated with performance in Peru	Supported
H _{2a} : Business organizations pursuing a cost leadership strategy will report greater profitability than those pursuing a differentiation strategy in Egypt	Partially supported
H _{2b} : Business organizations pursuing a cost leadership strategy will report greater profitability than those pursuing a differentiation strategy in Peru	Partially supported
H _{3a} : Business organizations pursuing a focus strategy will report greater growth than will their counterparts without a focus orientation in Egypt	Not supported
H _{3b} : Business organizations pursuing a focus strategy will report greater growth than will their counterparts without a focus orientation in Peru	Supported

to be as prevalent.

In a similar vein, support was found in both nations;

particularly Egypt, for the notion that adoption of a combination strategy (that is, cost leadership and

Table 6. Strategy and performance correlations.

Egypt	Profits	Sales growth	Profit and market growth
Low cost-differentiation	0.458*	0.055	0.018
Focus	-0.038	0.128	0.293*
Marketing/Differentiation	0.040	-0.118	0.403*

* Significant at 0.05 level

Table 7. Strategy and performance correlations.

Peru	Growth	Profitability
Low cost-differentiation	0.196*	0.343*
Focus	0.552*	-0.120
Marketing/Differentiation	0.357*	0.154*

*Significant at 0.05 level

Table 8. Strategy clusters.

Egypt	Cluster 1 LC-Diff (n=23)	Cluster 2 Mkt/Diff (n=25)	Cluster 3 Unclear (n=49)	Cluster 4 All Three (n=54)	F-Stat.	Significance
Strategy						
Low cost-diff	0.53	-2.07	0.15	0.59	389.633	0.000
Focus	-1.95	0.10	-0.07	0.85	273.369	0.000
Marketing-Diff	0.51	0.34	-0.87	0.42	29.094	0.000
Performance						
Profits	0.83	-0.84	-0.54	0.52	34.004	0.000
Sales growth	-0.59	-0.25	0.27	0.13	4.873	0.003
Profit/Market growth	-0.34	-0.04	-0.36	0.46	7.809	0.000

Table 9. Strategy clusters.

Peru	Cluster 1 Focus (n=98)	Cluster 2 LC-Diff (n=58)	Cluster 3 Mkt/Diff (n=48)	Cluster 4 Stuck (n=43)	F-Stat.	significance
Strategy						
Low cost-diff	0.13	1.12	-0.62	-1.12	122.945	0.000
Focus	1.00	-0.58	-0.84	-0.58	167.510	0.000
Marketing-Diff	0.07	-0.34	1.21	-1.06	86.180	0.000
Performance						
Growth	0.53	-0.07	0.08	-1.21	47.726	0.000
Profits	-0.23	0.83	0.09	-0.70	29.654	0.000

differentiation) can result in high performance specifically, emerging markets often rely more heavily on cost containment, integrating differentiation at the margin (Parnell and Koseoglu, 2009). Hence, the lack of a clear distinction between low cost and differentiation approaches in

nations like Egypt and Peru is plausible.

These findings reinforce the notion that cost leadership and differentiation are not at opposite ends of a strategy continuum because both strategies are subject to the same underlying cost tradeoffs (Jones and Butler, 1988).

Transaction costs represent the negotiating, monitoring, and enforcement costs associated with the transfer of goods and services between the firm and the consumer. Because they are the main component of differentiation and production costs are the main component of cost leadership, the difference between the two strategies can be viewed as one of degree rather than of kind. As such, the two strategies are not necessarily mutually exclusive. A contingency view of Porter's generic strategies also suggests that cost leadership and product differentiation can occur simultaneously, since each strategy may be linked to a variety of external means (Murray, 1998). For example, an effective cost leadership strategy stems primarily from an industry's structural characteristics, while a viable differentiation strategy stems from consumer tastes. Because these two sets of exogenous variables are different, simultaneous pursuit of low cost and differentiation strategies should not be precluded.

Second, several differences between Egypt and Peru were also found. Competitor emphasis is associated with marketing emphasis and overall differentiation efforts in Egypt, but with risk-taking, market breadth, and product line width in Peru. Both associations are intuitively appealing, but the distinction suggests that business, cultural, or other environmental factors likely play a role in strategy conceptualization. Also, performance items in Peru loaded cleanly on two dimensions, profitability and growth. Managers in Egypt distinguished between growth in revenues and growth in profits and markets. Again, both conceptualizations are plausible, but the distinction is noteworthy.

The nature of the strategy-performance relationship was also different. A sizeable high performing strategic group in Egypt emphasized all three strategy dimensions, but no such group was identified in Peru. Likewise, a sizeable poor performing strategic group in Peru did not emphasize any of the three strategy dimensions, but no such group was identified in Egypt.

Third, the nature of the strategy-performance linkage depends on the dimension of performance being assessed. The focus strategy was linked to growth but not profitability in both nations. Moreover, the combination strategy (that is, cost leadership and differentiation) was linked to profitability but not growth. Hence, different measures appear to be appropriate for different strategies (Hillman and Keim, 2001).

Finally, businesses concentrating their efforts on the marketing dimension of differentiation do not tend to perform well. Differentiation was a part of two factors in both nations, one linked to cost leadership and another linked to marketing efforts. Overall, businesses emphasizing only the marketing dimension were outperformed by others in the samples. Hence, differentiation as a part of a comprehensive strategic approach that includes cost containment appears to be effective, whereas differentiation based primarily on marketing efforts does not.

CONCLUSIONS AND FUTURE RESEARCH

The present study supports the cost leadership, differentiation, and focus conceptualizations of business strategy in both Egypt and Peru. No single "best strategy" can be generalized, however. Focus businesses in Peru orientation appeared to grow at a faster pace than their counterparts without a niche orientation, but a similar relationship was not found in Egypt.

A number of realistic avenues for future research have been identified. First, the research design in the present study invokes a strategic group perspective. However, discontent with the limited emphasis placed on organization-specific factors in strategic group analysis and strategy typologies sparked a renewed interest in the foundational role played by firm resources in strategy development (Barney, 1991). Resource-based theory emphasizes unique firm capabilities, competencies, and resources in strategy formulation, implementation, and performance (Dutta et al. 2005; Kor and Mahoney, 2005; Ray et al., 2004). The dynamic capabilities perspective extended the resource based perspective and emphasizes the role of idiosyncratic firm competencies (Wang and Hsu, 2010). Organizational economics (OE) has built on the resource based view by integrating perspectives such as agency theory, incentives, transaction cost theory, and property rights theory (Fulghieri and Hodrick, 2006; Sheehan and Foss, 2007; Whinston, 2003). Similar research that invokes a resource-based, dynamic capabilities or OE perspective can provide additional insight into the strategy-performance relationships in Egypt and Peru.

Second, replications of the present study in other emerging nations may identify factors that are common to developing nations. Both similarities and differences exist when Egypt is compared to its neighbors in Africa or the Middle East. Likewise, Peruvian business practice is distinct, as substantial cultural, structural, and economic differences exist among nations in the Latin American cluster (Husted and Allen, 2006; Kumar and Chase, 2006; Lenartowicz and Johnson, 2003).

Organization of the business enterprise invariably occurs within a cultural context (Gibson, 1994; Kogut, 1991). The need to understand the cultural impact on relationships among behavioral variables in organizations has never been more critical (Hutchings et al., 2010). Despite a growing interest in international comparative management, additional cross-cultural and empirical work is needed (Atiyah, 1993). Whereas scholars have typically viewed findings in Western organizations as universally applicable (Boyacilligar and Adler, 1991; Hofstede, 1980; Nelson, 1994), research highlighting the influence of culture and other factors has increased in recent decades. Additional empirical research investigating the role of culture and other factors in organizational processes and performance in developing nations is

needed (El-Amir and Burt, 2008; Elbanna and Younies, 2008). For example, the representation of women in Lima's work force has grown from about one-third in 1970 to about one-half by 2000 (Lazo, 1994; Sully de Luque and Arbazia, 2005). Historically, working conditions in Peru have been difficult and even abusive; Peruvian business structure is often seen as patriarchal, with high worker loyalty and resistance to change (Kumar and Chase, 2006; Morris and Pavett, 1992). Participative management approaches have begun to emerge during the last two decades however, (Buchenrieder and Heuft, 2003; Davila and Elvira, 2007; Galbraith and Nkwenti-Zamcho, 2005; Kumar and Chase, 2006; Sibeck and Stage, 2001; Sully de Luque and Arbazia, 2005). Recent research also suggests that Peruvian managers may be more open to participative management styles than their Egyptian counterparts (Escriba-Esteve et al., 2008; Weyzig, 2006).

Third, while sound research encourages one to maintain methodological consistency, problems arise when constructs and surveys are modified or translated to suit samples in other cultures (Parnell and Hatem, 1999). Such changes invariably present judgmental decisions that must be made by the researcher. Punnett and Shenkar (1994) warned against interviews, experiments and observational approaches where great religious differences exist between the researcher's home culture and that being studied. In addition, survey research is feasible when any language barriers are overcome, but less reliable when educational differences are also highly pronounced. Further, one's values can influence item interpretation and create response bias.

Following this logic, many management constructs developed in advanced Western nations may be inappropriate in emerging economies, especially those in Africa and the Middle East. Hence, new constructs may more accurately explain management behavior. There is also a need for modified research approaches to compare and contrast practices among widely divergent cultures without forcing one culture into the construct definition appropriate in another. Scholars should seek applications of management concepts so that existing theory can be applied to developing countries while at the same time allowing for substantial theoretical modifications when findings cannot be readily explained by prevailing models.

Fourth, the present study did not consider a prospective link between strategic group orientation and strategy conceptualizations. Hofstede's individualism (IDV) index, for example, represents the extent to which a society's members tend to function as individuals rather than members of groups. Low individualism in a society can facilitate teamwork because workers have a natural preference for identifying with and working as members of groups. It can also result in less individual initiative and even groupthink, however, as individuals are hesitant to

express unpopular opinions (Duimering and Robinson, 2009). Egypt and Peru produced low scores on the IDV, 38 and 16 respectively. The United States, where many of the early strategy-performance studies were conducted produced a very high score of 91.

Finally, differences in strategic behavior between large organizations and small and medium sized enterprises (SMEs) are well founded in the literature (Ghobadian & O'Regan, 2006). The present study addressed relationships across organizations of various sizes and was not limited to SMEs. Samples limited to specific industries or respondents at middle or upper management levels can isolate differences across nations with greater precision. Future students that investigate the role of firm size in the strategy-performance relationship in emerging nations are suggested.

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Full Length Research Paper

A two-echelon inventory model for fuzzy demand with mutual beneficial pricing approach in a supply chain

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This paper develops a two-echelon inventory model with mutual beneficial pricing strategy with considering fuzzy annual demand; single vendor and multiple buyers in this model. The beneficial pricing strategy can benefit the vendor more than multiple buyers in the integrated system, when price reduction is incorporated to entice the buyers to accept the minimum total cost. Negotiation factors is very important in the in fuzzy model, it can balance the cost saving between the players. A numerical example with sensitivity analysis is provided to demonstrate the theory. Finally, this paper can prove that the price reduction mechanism is a mutual beneficial strategic partnership between the vendor and buyers.

Key words: Fuzzy annual demand, price reduction.

INTRODUCTION

In the supply chain management today, JIT requires cooperation between the buyer and the vendor, which is very helpful to form a special partnership between the buyer and the vendor. When the partnership between the buyer and the vendor becomes strong, it is very helpful in achieving tangible benefits for each other (Kelle et al., 2002). An effect supply chain network needs the close partnership between the buyers and the vendors. The concept of serial multi-echelon structures to determine the optimal policy was presented by Clark and Scarf (1960). Banerjee (1968) derived a joint economic lot size model for a single vendor and single buyer system where the vendor has a finite replenishment rate. Goyal (1988) generalized Banerjee's (1968) model by relaxing the assumption of the lot-for-lot policy of the vendor and showed that quantity per cycle being an integer multiple of the buyer's purchase quantity provides a lower or equal joint total relevant cost as compared to Banerjee's (1968) model.

One of the early authors who analyzed a vendor-oriented optimal quantity discount policy that maximized

the vendor's gain was Monahan (1984), but did so at no additional cost to the buyer. Lee and Rosenblatt (1986) extended Monahan's (1984) model and developed a new algorithm to solve the vendor's ordering and price discount policy. Lal and Staelin (1984) extended to handle variable ordering and shipping costs and situations where the seller faces numerous groups of buyers, each having different ordering policies. Weng and Wong (1993) considered the discount of the vendor's quantity from the perspective of reducing the vendor's operating cost and increasing the buyer's demand.

Weng (1995) developed a model for analyzing the impact of joint decision policies on channel coordination in a system including a supplier and a group of analogous buyers. A lot-for-lot joint pricing policy with price-sensitive demand was developed by Li et al. (1996). A lot-for-lot discount pricing policy for deteriorating items with constant demand rate developed by Wee (1998). Wang and Wu (2000) derived a combined discount pricing policy for a supplier to maximize its quantity discount obtained from many different buyers. Lu (1995) and Goyal (1995) derived the integrated model between the vendor and the buyers with unequal lot size. Looking back on the past research, none of them considered the general replenishing and pricing policies for an integrated supply chain system.

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Today, many researches pay much attention on the integration of the vendor and the buyers. Although the vendor has greater benefits than the buyers do, the buyers may have no much interest in cooperating. In order to let the buyers order more quantity, some incentive policy like price reduction may be a good policy in the integrated system. Most of the related researches assumed the average demand per year is fixed constant, but it is usually difficult for managers to set the demand as crisp values in reality. So, many researchers have been applying fuzzy demand theory and techniques to develop and solve production inventory problems. For example, Park (1987) considered fuzzy inventory costs by using arithmetic operations of the extension principle. Chen et al. (1996) fuzzified the demand, ordering cost, inventory cost, and backorder cost into trapezoidal fuzzy numbers in an EOQ model with backorder consideration. Mahata et al. (2005) investigated the joint economic lot size model as fuzzy values of the economic lot size model for purchaser and vendor. They find that the joint total relevant cost is slightly higher than in the crisp model after defuzzification. Wu and Yao (2003) models and investigate an integrated inventory model with backorder for fuzzy order quantity and fuzzy shortage quantity that these are a normal triangular fuzzy number.

This paper present a two-echelon fuzzy inventory model with mutual beneficial pricing strategy considering JIT concept and price reduction to the buyers for ordering larger quantity, and this model incorporates the fuzziness of annual demand. A numerical example is carried out to demonstrate the approach and the significance of considering the integration of supply chain network.

ASSUMPTIONS AND NOTATIONS

Assumptions

The proposed model in this paper is developed on the following assumptions:

- (a) The replenishment rate of the buyers is instantaneous, but the vendor’s replenishment rate is finite.
- (b) All buyers have constant demand rate.
- (c) All players have complete information between each other.
- (d) There are only single vendor and multiple buyers in this model.
- (e) Shortage is not allowed.
- (f) The vendor’s cycle time for each buyer is assumed the same for decreasing setup times.
- (g) Each buyer demand rate is normal triangular fuzzy numbers.

There are three scenarios in this model:

- 1. The first scenario: we neglect integration and price

reduction.

- 2. The second scenario: we consider the integration of the vendor and the buyers, but we don’t consider price reduction.

- 3. The final scenario: we consider the integration and price reduction of the vendor and the buyers simultaneously.

Notations

We defined the common parameters of the vendor and the buyers as follow: N : Number of buyers; d_j : Demand rate for buyer j, j=1, 2, 3...N; \tilde{d}_j : Fuzzy demand rate for buyer j, j=1, 2, 3...N; $\tilde{d}_j = (d_j - \Delta_{1j}, d_j, d_j + \Delta_{2j})$;

D : Total demand rate of all buyers; \square : Total fuzzy

demand rate of all buyers; $\tilde{D} = \sum_{j=1}^n \tilde{d}_j$; TC : Integrated total cost of the vendor and the buyers; R_{S_v} : Negotiation factor of cost saving between vendor and all players; R_{S_j} : Negotiation factor of cost saving between buyer j and all players.

The parameters of the vendor are as follow: R : Replenishment rate; C_v : Setup cost, \$ per cycle; C_{vb} : Fixed cost to process buyer’s order of any size; UC : Unit cost; FC_v : Percentage inventory carrying cost per time per unit dollar; I_{vj} : Average inventory level with respect to buyer j; I_{vi} : Average inventory level in scenario i; TC_v : Total cost for vendor; CS_v : Cost saving of TC_{v3} with respect to TC_{v1} .

The parameters of the buyers are as follow: OC_{bj} : Ordering cost for buyer j; P_{bj} : Unit purchased price for buyer j to the vendor; FC_{bj} : Percentage inventory carrying cost for buyer j per year per dollar; TC_b : Total cost for all buyers; CS_{bj} : Cost saving of TC_{b3j} with respect to TC_{b1j} for buyer j; CS_b : Cost saving of TC_{b3} with respect to TC_{b1} for all buyers.

The decision variables are: n_j : Number of deliveries from vendor to buyer j per cycle; P_{bj} : Unit purchased price for buyer j to the vendor; Q_{bj} : Lot size for buyer j.

PROPOSED MODEL WITH FUZZY DEMAND

By using Wee and Yang’s (2007) research, we can get a mathematic model of the buyers and the vendor

subscripted thus: The buyer j 's annual total cost (TC_{bij}) and all buyers' annual total costs (TC_{bi}) are:

$$TC_{bij} = \frac{d_j OC_{bj}}{Q_{bij}} + \frac{Q_{bij} P_{bij} FC_{bj}}{2} - (P_{b1j} - P_{bij}) d_j \tag{1}$$

$$TC_{bi} = \sum_{j=1}^N \frac{d_j OC_{bj}}{Q_{bij}} + \sum_{j=1}^N \frac{Q_{bij} P_{bij} FC_{bj}}{2} - \sum_{j=1}^N (P_{b1j} - P_{bij}) d_j \tag{2}$$

Since the vendor's cycle time interval $\frac{n_{ij} Q_{bij}}{d_j}$ for each buyer is assumed the same for decreasing setup times, the relationship between Q_{bij} and Q_{bi1} is as follows:

$$Q_{bij} = \frac{d_j n_{i1} Q_{bi1}}{n_{ij} d_1} \tag{3}$$

The vendor's average inventory level, I_{vi} is:

$$I_{vi} = \sum_{j=1}^N \frac{Q_{bij}}{2} \left[(n_{ij} - 1) \left(1 - \frac{D}{P} \right) + \frac{D}{P} \right] \tag{4}$$

The vendor's annual total cost is:

$$TC_{vi} = \frac{D \left(C_v + \sum_{j=1}^N n_{ij} C_{vb} \right)}{\sum_{j=1}^N n_{ij} Q_{bij}} + \sum_{j=1}^N I_{vij} P_v F_v + \sum_{j=1}^N (P_{b1j} - P_{bij}) d_j \tag{5}$$

Consider the problem with fuzzy annual demand d_j by fuzzifying to a triangular fuzzy number \tilde{d}_j , where $\tilde{d}_j = (d_j - \Delta_{1j}, d_j, d_j + \Delta_{2j})$, $0 < \Delta_{1j} < d_j$, $0 < \Delta_{2j} < d_j$

and Δ_{1j}, Δ_{2j} are both determined by decision-makers. In this case, buyer j 's annual total cost and all buyers' annual total costs with fuzzy demand can be expressed as:

$$\square TC_{bij} = \frac{\square d_j OC_{bj}}{Q_{bij}} + \frac{Q_{bij} P_{bij} FC_{bj}}{2} - (P_{b1j} - P_{bij}) \square d_j \tag{6}$$

and

$$\square TC_{bi} = \sum_{j=1}^N \frac{\square d_j OC_{bj}}{Q_{bij}} + \sum_{j=1}^N \frac{Q_{bij} P_{bij} FC_{bj}}{2} - \sum_{j=1}^N (P_{b1j} - P_{bij}) \square d_j \tag{7}$$

Accordingly, the vendor's average inventory level and the vendor's annual total cost with fuzzy annual demand can

be expressed as:

$$\square I_{vi} = \sum_{j=1}^N \frac{Q_{bij}}{2} \left[(n_{ij} - 1) \left(1 - \frac{\square D}{P} \right) + \frac{\square D}{P} \right],$$

Where,

$$\square D = \sum_{j=1}^n \square d_j \tag{8}$$

and

$$\square TC_{vi} = \frac{\square D \left(C_v + \sum_{j=1}^N n_{ij} C_{vb} \right)}{\sum_{j=1}^N n_{ij} Q_{bij}} + \sum_{j=1}^N \square I_{vij} P_v F_v + \sum_{j=1}^N (P_{b1j} - P_{bij}) \square d_j \tag{9}$$

Where,

$$\square D = \sum_{j=1}^n \square d_j$$

Definition 1

From Kaufmann and Gupta (1991), Zimmermann (1996), Yao and Wu (2000), for any a and $0 \in R$, they define the signed distance from a to 0 as $d_0(a, 0) = a$. If $a > 0$, a is on the right hand side of origin 0; and the distance from a to 0 is $d_0(a, 0) = a$. If $a < 0$, a is on the left hand side of origin 0; and the distance from a to 0 is $-d_0(a, 0) = -a$. This is the reason why $d_0(a, 0) = a$ is called the signed distance from a to 0.

Let Ω be the family of all fuzzy sets $\square A$ defined on R , the α -cut t of $\square A$ is $A(\alpha) = [A_L(\alpha), A_U(\alpha)]$, $0 \leq \alpha \leq 1$, and both $A_L(\alpha)$ and $A_U(\alpha)$ are continuous functions on $\alpha \in [0, 1]$. Then, for any $\alpha \in \Omega$, we have:

$$\square A = \bigcup_{0 \leq \alpha \leq 1} [A_L(\alpha)_\alpha, A_U(\alpha)_\alpha] \tag{10}$$

Besides, for every $\alpha \in [0, 1]$, the α -level fuzzy interval $[A_L(\alpha)_\alpha, A_U(\alpha)_\alpha]$, has a one-to-one correspondence

with the crisp interval $[A_L(\alpha), A_U(\alpha)]$ that is, $[A_L(\alpha)_\alpha, A_U(\alpha)_\alpha] \leftrightarrow [A_L(\alpha), A_U(\alpha)]$ is one-to-one mapping. From Definition 1, the signed distance of two end points, $A_L(\alpha)$ and $A_U(\alpha)$ to 0 are $d_0(A_L(\alpha), 0) = A_L(\alpha)$ and $d_0(A_U(\alpha), 0) = A_U(\alpha)$, respectively. Hence, the signed distance of interval $[A_L(\alpha), A_U(\alpha)]$ to 0 can be represented by their average of $[A_L(\alpha), A_U(\alpha)]$. Therefore, the signed

distance of interval $[A_L(\alpha), A_U(\alpha)]$ to 0 can be represented as:

$$d_0([A_L(\alpha)_\alpha, A_U(\alpha)_\alpha], 0) = [d_0(A_L(\alpha), 0) + d_0(A_U(\alpha), 0)] / 2 = (A_L(\alpha) + A_U(\alpha)) / 2 \tag{11}$$

Further, because of the 1-level fuzzy point, \square_0 is mapping to the real number 0, the signed distance of $[A_L(\alpha)_\alpha, A_U(\alpha)_\alpha]$ to \square_0 can be defined as:

$$d_0([A_L(\alpha)_\alpha, A_U(\alpha)_\alpha], \square_0) = d_0([A_L(\alpha), A_U(\alpha)], 0) = [A_L(\alpha) + A_U(\alpha)] / 2 \tag{12}$$

Thus, from (11) and (12), since this function is continuous on $0 \leq \alpha \leq 1$ for $A \in \Omega$, we can use further equation to define the signed distance of A to \square_0 .

Next, defuzzify $\square TC_{bi}$ and $\square TC_{vi}$ by using the signed distance method. From Definition 1, the signed distance of $\square TC_{bi}$ and $\square TC_{vi}$ to \square_0 is given by:

$$d(\square TC_{bi}, \square_0) = \sum_{j=1}^N \frac{d(d_j, \square_0) OC_{bj}}{Q_{bij}} + \sum_{j=1}^N \frac{Q_{bij} P_{bij} FC_{bj}}{2} - \sum_{j=1}^N (P_{b1j} - P_{bij}) d(d_j, \square_0) \tag{13}$$

$$d(\square TC_{vi}, \square_0) = \frac{d(D, \square_0) \left(C_v + \sum_{j=1}^N n_{ij} C_{vb} \right)}{\sum_{j=1}^N n_{ij} Q_{bij}} + \sum_{j=1}^N I_{vij} P_v F_v + \sum_{j=1}^N (P_{b1j} - P_{bij}) d(d_j, \square_0) \tag{14}$$

where $D = \sum_{j=1}^n d_j$, $d(d_j, \square_0)$ the signed distance of fuzzy number d_j to \square_0 by Appendix, that is:

$$d(d_j, \square_0) = \frac{1}{4} \left[(d_j - \Delta_j) + 2d_j + (d_j + \Delta_j) \right] = d_j + \frac{1}{4} (\Delta_{2j} - \Delta_{1j}) \tag{15}$$

Substituting the result of (14) into (15) and (13), we have:

$$TC_{bi} \equiv d(\square TC_{bi}, \square_0) = \sum_{j=1}^N \frac{OC_{bj}}{Q_{bij}} \left(d_j + \frac{1}{4} (\Delta_{2j} - \Delta_{1j}) \right) + \sum_{j=1}^N \frac{Q_{bij} P_{bij} FC_{bj}}{2} - \sum_{j=1}^N (P_{b1j} - P_{bij}) \left(d_j + \frac{1}{4} (\Delta_{2j} - \Delta_{1j}) \right) \tag{16}$$

$$TC_{vi} \equiv d(\square TC_{vi}, \square_0) = \frac{\sum_{j=1}^N \left(d_j + \frac{1}{4} (\Delta_{2j} - \Delta_{1j}) \right) \left(C_v + \sum_{j=1}^N n_{ij} C_{vb} \right)}{\sum_{j=1}^N n_{ij} Q_{bij}} + \sum_{j=1}^N I_{vij} P_v F_v + \sum_{j=1}^N (P_{b1j} - P_{bij}) \left(d_j + \frac{1}{4} (\Delta_{2j} - \Delta_{1j}) \right) \tag{17}$$

Where TC_{bi} is regard as total cost for all buyers in the i-th scenario in the fuzzy sense; TC_{vi} is regard as total cost of the vendor in the i-th scenario in the fuzzy sense.

DISCUSSION FOR THREE SCENARIOS

We follow Wee and Yang’s (2007) model to make the discussion of three scenarios.

Scenario 1: Integration and price reduction are not considered

By buyer viewpoint, the buyers have the priority to make the first-step decision. The related costs without integration are as follows:

$$TC_{b1}^* = \underset{all\ Q_{b1j},\ n_{1j}}{Minimize} \sum_{j=1}^N TC_{b1j} \tag{18}$$

Subject to
$$Q_{b1j} = \frac{\tilde{d}_j n_{1j} Q_{b11}}{n_{1j} \tilde{d}_1}$$

$$TC_{v1}^* = Minimize\ TC_{v1} \tag{19}$$

and

$$TC_1^* = TC_{v1}^* + TC_{b1}^* \tag{20}$$

Scenario 2: The integration of the vendor and all buyers without price reduction

The purchased unit cost for each buyer in scenario 2 is assumed to be the same as that in scenario 1. The purpose of integration is to minimize the integrated total cost through information and profit sharing. The optimal value of the integrated total cost in scenario 2 is:

$$TC_2^* = \underset{all\ Q_{b2j},\ n_{2j}}{Minimize} (TC_{v2} + TC_{b2}) \tag{21}$$

Subject to
$$Q_{b2j} = \frac{\tilde{d}_j n_{2j} Q_{b21}}{n_{2j} \tilde{d}_1}$$

Scenario 3: The integration of the vendor and all buyers with price reduction

The discount price of the j-th buyer, P_{b3j} is smaller than P_{b1j} or P_{b2j} . Let buyer j’s cost saving be defined as the

difference between TC_{b3j} and TC_{b1j} , and all buyers’ cost saving be the difference between TC_{b3} and TC_{b1} , one has:

$$Cs_{bj} = TC_{b1j} - TC_{b3j} \tag{22}$$

and

$$Cs_b = TC_{b1} - TC_{b3} \tag{23}$$

Their relationship is defined as:

$$Rs_{bj} = \frac{Cs_{bj}}{Cs_v + Cs_b} \tag{24}$$

and

$$Rs_v = \frac{Cs_v}{Cs_v + Cs_b} \tag{25}$$

Where Rs_{bj} and Rs_v are the negotiation factors and
$$Rs_v + \sum_{j=1}^N Rs_{bj} = 1$$

$$TC_3^* = \sum_{j=1}^N \underset{all\ Q_{b1j},\ n_{1j}}{Minimize} (TC_{b3j} + TC_{v3j}) \tag{26}$$

Subject to constraints (3), (24) and (25). Substituting (3) into (26), TC_3 is function of Q_{b31} , n_{3j} and P_{b3j} . For each integer n_{3j} , one can solve Q_{b31} by satisfying the following condition:

$$\frac{\partial TC_3}{\partial Q_{b31}} = 0 \tag{27}$$

Substituting Q_{b31} from (27) into (24) and (25), each P_{b3j} can be derived by solving the simultaneous equations of (24) and (25). $TC_3(n_{3j})$ is the integrated total cost in scenario 3 and a function of variable n_{3j} . The optimal solution of n_{3j} can be derived to satisfy the following condition:

$$TC_3(n_{3j} - 1) \geq TC_3(n_{3j}) \leq TC_3(n_{3j} + 1) \tag{28}$$

It is noted that the variables P_{b3j} , Q_{b3j} and n_{3j} are optimized jointly with constraints (3), (24) and (25).

Table 1. The optimal solutions in various scenarios.

Scenario i	1	2	3
P_{bi1}	25	25	23.264
P_{bi2}	25	25	23.221
n_{i1}	3	1	1
n_{i2}	4	2	1
Q_{bi1}	97	302	286
Q_{bi2}	145	302	572
TC_i	4744	4,304	4,199
$TC_i - TC_1$	---	-440	-545
TC_{bi}	1,208	1,759	844
$TC_{bi} - TC_{b1}$	---	+551	-364
TC_{bi1}	500	838	318
TC_{bi2}	708	921	526
TC_{vi}	3,537	2,546	3,355
$TC_{vi} - TC_{v1}$	---	-991	-182

Thus, we can use the following procedure to find the optimal values of Q and n for fuzzy annual demand.

For $j= 1, 2, \dots, N$.

Step 1: Obtain Δ_{1j} and Δ_{2j} from the decision-makers.

Step 2: Use Q_{b31} from (27) to determine RS_{bj} and RS_v .

Step 3: Compute P_{b3j} from equation (24) and (25).

Step 4: Compute n_{3j} by inequality (28).

The $TC_3^*(Q_{b3j}, n_{3j}, P_{b3j})$ is the optimal joint total expected annual cost.

NUMERICAL EXAMPLE

The preceding theory can be illustrated by the following numerical example. One vendor and two buyers annual demand rate $d_1 = 250, d_2 = 500$ units per year, vendor’s replenishment rate: $R = 12,000$ units per year; buyers’ ordering cost $OC_{b1} = \$ 100, OC_{b2} = \$ 100$; buyers’ percentage carrying cost per year per dollar $FC_{b1} = 0.2, FC_{b2} = 0.2$ buyers’ purchased unit price before price discount: $P_{b11} = P_{b12} = \$ 25, P_{b21} = P_{b22} = \$ 25$ vendor’s setup cost $CV = \$ 2,000$; vendor’s fixed cost to process buyer’s order of any size $C_{vb} = \$ 100$; vendor’s percentage carrying cost per year per dollar $F_{cv} = 0.2$ vendor’s unit cost $U_c = \$ 20$; negotiation factors: $RS_v =$

$1/3, RS_{b1} = 1/3, RS_{b2} = 1/3$. The optimal solutions in various scenarios are discussed in Table 1 (Wee and Yang 2007).

In Table 1, we got the following information: scenario 3 has the lowest price than scenarios 1 and 2. Scenario 3 has the highest lot size than scenarios 1 and 2 and scenario 3 has the lowest total cost than scenarios 2 and 1. As such, scenario 3 (the integration and price reduction of the vendor and the buyers simultaneously) is the best solution in the 3 scenarios. By revising scenario 3, we discussed scenario 3 with fuzzy annual demand in this paper. For the model proposed in scenario 3, solve for the optimal unit purchased price for buyer j in scenario 3:

P_{b3j} , and find the optimal lot size for buyer j in scenario 3: Q_{b3j} , and number of deliveries from vendor to

buyer j per cycle in scenario 3: n_{3j} in the fuzzy sense for various given sets of $(\Delta_{1j}, \Delta_{2j}), j = 1, 2$. Note that in practical situations, Δ_{1j} and Δ_{2j} are determined by the decision-makers due to the uncertainty of the problem. The results are summarized in Tables 2 and 3 and the total cost of buyer and vendor are summarized in Table 4.

Furthermore, Tables 2 and 3 lists the results of the fuzzy case results with those of the crisp one; Table 4 lists the result of total cost in scenario 3 which is with the fuzzy annual demand. The optimal unit purchased price for buyer $P_{b3j}, j = 1, 2$ and the optimal lot size for buyer $Q_{b3j}, j = 1, 2$ can be derived easily from Wee and Yang (2007) using the classical optimization technique.

Consequently, we have $P_{b31}^{**} = 23.264, P_{b32}^{**} = 22.221$ unit price $Q_{b31}^{**} = 286, Q_{b32}^{**} = 572$ and $TC_3^{**} = 4198.74$. Then

Table 2. Optimal solutions for the model with fuzzy demand of the buyer 1.

d_1	P_{b31}^*	Q_{b31}^*	n_{31}	$V_{P_{b31}}(\%)$	$V_{Q_{b31}}(\%)$
(200,250,400)	23.374	298	1	0.0047	0.0420
(225,250,475)	23.471	310	1	0.0089	0.0839
(50,250,450)	23.264	286	1	0.0000	0.0000
(25,250,275)	22.989	258	1	-0.0118	-0.0979
(100,250,300)	23.138	272	1	-0.0054	-0.0490

Table 3. Optimal solutions for the model with fuzzy demand of the buyer 2.

d_2	P_{b32}^*	Q_{b32}^*	n_{32}	$V_{P_{b32}}(\%)$	$V_{Q_{b32}}(\%)$
(475,500,725)	23.320	597	1	0.0043	0.0437
(450,500,950)	23.406	620	1	0.0080	0.0839
(50,500,950)	23.221	572	1	0.0000	0
(50,500,550)	22.974	517	1	-0.0106	-0.0962
(275,500,575)	23.108	545	1	-0.0049	-0.0472

Table 4. Total cost in scenario 3.

TC_{b31}	TC_{b32}	TC_{b3}	TC_{V3}	TC_3^*	$V_{TC_3}(\%)$
341.68	560.33	902.01	3522.15	4424.16	0.0537
365.68	591.55	957.23	3683.63	4640.86	0.1053
318.76	526.15	844.91	3353.83	4198.74	0.0000
268.44	454.73	723.17	3094.63	3817.8	-0.0907
293.12	490.55	783.67	3085.29	3868.96	-0.0785

Then, the relative variation between fuzzy case and crisp one for the optimal unit purchased price and the optimal lot size and the optimal total cost can be measured by $V_{P_{b3j}}(\%) = (P_{b3j}^* - P_{b3j}^{**}) / P_{b3j}^{**} \times 100\%$ and $V_{Q_{3j}}(\%) = (Q_{b3j}^* - Q_{b3j}^{**}) / Q_{b3j}^{**} \times 100\%$ $j = 1,2$; $V_{TC_3}(\%) = (TC_3^* - TC_3^{**}) / TC_3^{**} \times 100\%$, respectively, as reported in the last two columns of Tables 2 and 3, and the last column of Table 4. From Tables 2, 3 and 4, we observe that:

(1) when $\Delta_{1j} < \Delta_{2j}$ for $j = 1,2$, as $(\Delta_{21} - \Delta_{11})$ increase up to 0 from 200; $(\Delta_{22} - \Delta_{12})$ increase up to 0 from 400 both $V_{P_{b3j}}$ and $V_{Q_{b3j}}$ $j=1,2$ and V_{TC_3} , increase simultaneously. As $(\Delta_{2j} - \Delta_{1j})$ for $j = 1, 2$ increase, $V_{P_{b3j}}, V_{Q_{b3j}}, V_{TC_3}$ increase.

(2) when $\Delta_{1j} > \Delta_{2j}$, $j = 1,2$ then we have $d(d_j, \theta_1) < d_j$, $j = 1,2$. In this case, $P_{b31}^* < P_{b31}^{**}$ $Q_{b31}^* < Q_{b31}^{**}$ and

$P_{b32}^* < P_{b32}^{**}$, $Q_{b32}^* < Q_{b32}^{**}$ and $TC_3^* < TC_3^{**}$ which result in $V_{P_{b3j}} < 0$, $V_{Q_{b3j}} < 0$ $j=1,2$ and $V_{TC_3} < 0$. Further, as the value $(\Delta_{2j} - \Delta_{1j})$ $j = 1,2$ decreases, both $V_{P_{b3j}}$ $V_{Q_{b3j}}$ $j=1,2$ and V_{TC_3} decrease, which means the smaller the difference between Δ_{1j} and Δ_{2j} the smaller the variation of the solutions between fuzzy case and crisp case.

(3) when $\Delta_{11} = \Delta_{21} = 200$, $d(d_1, \theta_1) = d_1 = 250$; $\Delta_{12} = \Delta_{22} = 500$, $d(d_2, \theta_1) = d_2 = 500$ In this case, the solutions of the fuzzy case are identical to those of the crisp case, and hence $V_{P_{b3j}} = 0$, $V_{Q_{b3j}} = 0$ $j=1,2$ and $V_{TC_3} = 0$.

From the example, although we can not ascertain which of the solution is better, the major advantage of the fuzzy model is that the uncertainty of the real situation is obtained well than the crisp model. In addition, the

decision-makers can use the solution which derived from the fuzzy model to perform sensitivity analysis, and to examine the effects of uncertainties.

CONCLUSION

In this paper, we discussed the proposed model with fuzzy annual demand. Uncertainties of annual demand are interested in real supply chain inventory systems. However, we don't pay much attention to this in past study, and it is because there may be a lack of historical data to estimate the annual demand. In this situation, using a crisp value is not appropriate. The proposed model of Wee and Yang (2007) is worthwhile to be reconsidered and we provide an alternative approach. This paper proposes a fuzzy model for two-echelon inventory problem. For the fuzzy model, a method of defuzzification, namely the signed distance, is employed to find the estimation of total profit per unit time in the fuzzy sense and then the corresponding optimal P_{bj} and Q_{bj} are derived to minimize the total cost. Additionally, the proposed fuzzy model can be reduced to a crisp problem and the optimal lot size and price in the fuzzy sense can be reduced to that of the classical two-echelon inventory model. Although we are not sure the solution obtained from the fuzzy model is better than the solution of the crisp one, the fuzzy approach has the advantage that keeps the uncertainties which always correspond with the real situations better than the crisp one does. Furthermore, the inventory problem in the real situation can be properly solved with this proposed fuzzy model.

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APPENDIX

For a fuzzy set $\bar{A} \in \Omega$ and $\alpha \in [0,1]$, the $\alpha \in cut$ of the fuzzy set \bar{A} is;

$$A(\alpha) = \{x \in \Omega \mid u_A(x) \geq \alpha\} = [A_L(\alpha), A_U(\alpha)],$$

where $A_L(\alpha) = a + (b-a)\alpha$ and $A_U(\alpha) = c - (c-b)\alpha$.

From Definition 1, we obtain the following equation. The signed distance of \bar{A} to $\bar{\theta}_1$ is defined as:

$$d(\bar{A}, \bar{\theta}_1) = \int_0^1 d([A_L(\alpha), A_U(\alpha)], \bar{\theta}_1) d\alpha = \frac{1}{2} \int_0^1 (A_L(\alpha), A_U(\alpha)) d\alpha$$

So this equation is:

$$a(\bar{A}, \bar{\theta}_1) = \frac{1}{2} \int_0^1 [A_L(\alpha), A_U(\alpha)] d\alpha = \frac{1}{4}(2b+a+c)$$

Full Length Research Paper

The impact of inaccessibility to bank finance and lack of financial management knowledge to small, medium and micro enterprises in Buffalo City Municipality, South Africa

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This study investigated the impact of inaccessibility of bank finance and lack of financial management knowledge to small, micro and medium enterprises (SMMEs) in the Buffalo City Municipality. The objectives of the study were to determine the impact of lack of financial management knowledge on access to finance, to investigate effects of lack of bank finances to the success and growth of SMMEs, to determine the impact of financial illiteracy to the success and growth of SMMEs and to identify possible solutions to the problem of inaccessibility of bank finance and lack of financial management knowledge. A questionnaire was used to gather data from respondents. Simple random sampling technique was used. Data was analysed using descriptive statistics. Findings of this research showed that SMMEs in the Buffalo City Municipality find it difficult to access bank finance. The research results also showed that inaccessibility of bank finance have a greater impact on survival and success of SMMEs. It also highlighted that lack of financial management knowledge have an impact on survival and growth of SMMEs. SMMEs are encouraged to explore other financing options and also to take responsibility for acquiring skills and knowledge that will lead them to success.

Key words: SMMEs, impact, inaccessibility of finance, financial management, knowledge, bank.

INTRODUCTION

The small, medium and micro enterprises (SMMEs) sector is globally regarded as the driving force in economic growth and job creation. These businesses play a major role in creating jobs and wealth in any economy. Central to the growth of an economy is the development of a vibrant SMME sector which is the key to resolving many societal challenges, including unemployment (Entrepreneur SA, 2005).

SMMEs form the backbone of South Africa's economy, not just in terms of their contribution to national gross domestic product, but especially in terms of employment. According to 2009 estimates, a staggering 74% of South Africans active in the economy are employed by SMMEs

(The Business Place, 2009). SMMEs are often the first to be offering new products in the market and they are more flexible than large organisations (Boone and Kurtz, 2006). This therefore means that SMMEs can meet and satisfy customers' or the population's needs better than bigger businesses that lack flexibility.

According to Visagie (1997), in most areas in South Africa, where active population is too small to justify large enterprises, the only source of economic activity is that provided by SMMEs. This justifies why this sector has received much attention from the government in recent years.

Despite support provided by the government in South Africa, SMMEs still face challenges. The main problem faced by owners and operators of SMMEs is the inaccessibility of bank finances. The lack or inaccessibility of bank finances is a serious constraint during the formation of new ventures as well as at later stages as business

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requires additional inflows of capital to support expansion and growth (Nieuwenhuizen and Groenewald, 2004).

Inadequate bookkeeping and lack of financial management knowledge are also challenges that have negative impacts on SMMEs. According to Schagen and Lines (1996), financial illiteracy is the inability to make informed judgements and to take effective decisions regarding the use and management of funds.

Problem statement

In South Africa, a disappointingly high number of SMMEs fail during the first few years of operation (Nieman and Nieuwenhuizen, 2009). Inaccessibility of bank finance is one of the major challenges that South African SMMEs face among others. In addition to this, most owners and operators of SMMEs are financially illiterate, which leads to mismanagement of business finances causing most SMMEs to fail. According to Nieman and Nieuwenhuizen (2009), the largest percentage of SMMEs fails during the first two years of their existence due to cash flow problems that arise because they could not manage growth. Cash flow problems can occur as a result of inaccessibility of bank finances or lack of financial management knowledge. Unemployment in the Eastern Cape Province and South Africa at large is a challenge to the nation and SMMEs play a major role in curbing this problem. SMMEs need to be supported and they also need to be able to access resources they need, to survive and grow. Inaccessibility of bank finance and financial illiteracy are real challenges faced by SMMEs. The impact of these challenges needs to be assessed so as to come up with useful and relevant solutions that can contribute to the success of South African SMMEs.

Objective of the study

The primary objective of the study was to investigate the impact of inaccessibility of bank finance and lack of financial management knowledge to the growth and success of SMMEs in the Buffalo City Municipality. The purpose of this study stems from the fact that SMMEs play an important role in the South African economy in terms of employment creation, sustainable output growth, the equitable distribution of income and the overall stimulation of the economy. Considering the role played by SMMEs in the South African economy and the challenges they are facing, it is in the interest of the country at large to investigate the impact of these challenges.

Secondary objectives

- i. Determine the impact of lack of financial management knowledge on the accessibility to finance.
- ii. Investigate the effects of lack of bank finances to the success and growth of SMMEs.

iii. Determine the impact of lack of financial management knowledge (financial illiteracy) to the success and growth of SMMEs.

iv. Identify possible solutions to the problem of inaccessibility of bank finance and lack of financial management knowledge.

Research hypotheses

H₀: SMMEs in the Buffalo City Municipality, South Africa find it difficult to access bank finance

H₁: SMMEs in the Buffalo City Municipality, South Africa can easily access bank finance

H₀: Inaccessibility of bank finance does not have greater impact on survival of SMMEs

H₂: Inaccessibility of bank finance has a greater impact on survival of SMMEs

H₀: Inaccessibility of bank finance does not have greater impact on growth of SMMEs

H₃: Inaccessibility of bank finance has a greater impact on growth of SMMEs

H₀: Lack of financial management knowledge (financial illiteracy) does not have an effect on access to bank finance

H₄: Lack of financial management knowledge (financial illiteracy) has a negative effect on access to bank finance

LITERATURE REVIEW

Theoretical construct

According to Sogorb (2002), the most relevant capital structure theories that explain the capital structure of SMMEs are those related to static trade-off, adverse selection and moral hazard (agency theory) and the pecking order theory. Andree and Kallberg (2008) point out that the genesis of modern capital structure theory lies in the work of Modigliani and Miller (1958) in their famous proposition which is referred to as the irrelevance theorem. The irrelevance theorem suggests that, as an implication of equilibrium in perfect capital markets, the choice of capital structure does not affect a firm's market value. Modigliani and Miller (1958) based their irrelevance theorem on certain perfect market assumptions which included no corporate taxes, no brokerage or floatation cost for securities, and symmetrical information.

According to Fatoki and Odeyemi (2010), the initial perfect market assumptions, on which the 1958 theory of

Modigliani and Miller was based, were reviewed in 1963 with the introduction of the tax benefits of debt. This is attributed to the fact that a perfect market does not exist in the real world. Since interest on debt is tax-deductible, thereby creating tax savings for the borrower, it becomes possible for firms to minimize their costs of capital and maximize shareholders' wealth by using debt. According to Miller and Modigliani (1963) a firm should have 100% debt in its capital structure. In this way, the firm can take absolute advantage of the tax-shield. Scott (1972) and Kraus and Litzenberger (1973) point out that theoretically, 100% tax shield does not exist in reality because of distress costs.

Sogorb (2002) and Andree and Kallberg (2008) found that the fiscal advantage of debt cannot be applied in the SMME context because some SMMEs are unlikely to be profitable and therefore may not be able to use debt in order to get tax shields. Daniel et al. (2006) point out that in the case of most SMMEs, the expected costs of bankruptcy is quite high and the expected costs of financial distress may outweigh any potential benefits from the tax shield.

SMMEs also have limited access to external equity capital such as venture capital and the stock market. This implies that most SMMEs will have to rely only on internal equity which is often inadequate as a source of capital. According to Fatoki and Odeyemi (2010), the limitations of static trade off theory suggest the reliance on internal equity by SMMEs. Yet, the reality for growing SMMEs is a reliance on bank finance (debt) and external equity because of the inadequacy of internal equity (Frelinghaus et al., 2005).

According to Stiglitz and Weiss (1981), agency problems such as asymmetric information and moral hazards can impact on the availability of credit and hence the capital structure of new SMMEs. Stiglitz and Weiss termed this phenomenon credit rationing. The core of the argument is that suppliers of finance may choose (due to asymmetric information, adverse credit selection and monitoring problems) to offer an array of interest rates that would leave a significant number of potential borrowers without access to credit.

Stiglitz and Weiss (1981) stressed that agency problems such as asymmetric information and moral hazards can impact on the availability of bank finance to SMMEs. Stiglitz and Weiss termed this phenomenon credit rationing. The Stiglitz-Weiss model of bank lending explains why bank finance (credit) rationing occurs, and why many existing SMMEs who wish to borrow at the existing interest rate, and is willing to pay higher interest rate, are still unable to obtain bank finance. The model also shows the relationship between bank finance (credit) rationing and loans to small scale enterprises.

According to Fatoki and Odeyemi (2010), the Stiglitz and Weiss' theory therefore suggests that there are significant numbers of SMMEs that could use funds productively if they were available, but cannot obtain finance from the

formal financial system. In terms of agency cost theory, SMMEs are expected to have the least debt and thus depend on internal equity and that debt levels will gradually increase as the firm develops and becomes established (Fatoki and Odeyemi, 2010).

Frelinghaus et al. (2005) disagree with the pattern of relationship suggested by the agency theory. The authors argue that whilst it is true that firms in latter stages do in fact have more debt than firms in prime, the agency theory cannot explain why firms in the early stages of development have more debt than firms in prime.

According to Myers (1984) the pecking order theory suggests that there is no well-defined optimal capital structure, instead, the debt ratio is the result of hierarchical financing over time. Management has a preference to choose internal financing before external financing. When a firm is forced to use external financing sources, debt is preferred to equity.

Nguyen and Ramachandran (2006) however argue that the pecking order theory may not apply to SMMEs because they suffer from information asymmetry. Small size is likely to lead to severe information asymmetries between the SMME owners and potential lenders because SMMEs are unlikely to have adequate and reliable financial statements. According to Bose and Cotheren (1997), information asymmetry can negatively affect SMME access to debt capital.

Empirical review

According to Fatoki and Garwe (2010), inaccessibility of finance is the second most reported contributor to low firm creation and failure, after education and training in South Africa. Herrington and Wood (2003) also concluded that lack of education and training has reduced management capacity in new firms in South Africa. Lack of education and skills can as well mean or lead to lack of financial management knowledge. In support of this notion, Fatoki and Garwe (2010) also concluded that lack of knowledge and training is one of the reasons for the low level of entrepreneurial creation and the high failure rate of SMMEs in South Africa.

In their study, Herrington et al. (2009) suggested that access to finance is the major problem for South African SMMEs. Cassar (2004) makes it clear that inaccessibility of finance can be a constraint on SMME growth. A research conducted by Naude and Havenga (2004) indicated that most entrepreneurs, specifically SMMEs, struggled with accessing finances from banks due to excessive red tape and administrative burden. They argued that financial institutions rarely finance start up businesses, they are bureaucratic, lack knowledge or understanding of the owners or operators of SMMEs (entrepreneurs), and are not willing to assist and are wary in providing finance to people who do not have a business record.

Access to finance and financial illiteracy are not the only challenges faced by SMMEs, Rogerson (2006) in the study conducted in the Free State province on SMMEs identified access to finance, inadequate premises, lack of equipment and tools, inadequate markets and marketing, theft, registering and transport challenges as attributes to failure rate in that province.

From the findings of Rogerson (2006), inaccessibility to finance is the primary challenge and all other challenges can be said to be as a result of inaccessibility to finance. The findings of the study by Mutezo (2005) reveal the fact that conventional financing mechanisms do not allow for cost effective provision of finance to large numbers of entrepreneurs or SMMEs seeking small quantities of finance. Mutezo (2005) argues that poverty and lack of assets indicate that many people do not have the collateral needed to access formal financing. According to Mutezo (2005), entrepreneurial activity is hampered by lack of access to finance. Poor management is a common reason for the failure of small organisations. A lack of business training and knowledge often leads to bankruptcy (Boone and Kurtz, 2006).

Mutezo (2005) asserts that the key factor militating against increased investment in SMME sector is the structure of the financial sector. He argued that the financial sector is composed by concentrated banking sector targeting corporate accounts and competing with smaller niche banks. He added that there is a strong dearth of strong alternative financial institutions providing credit to self-employed for productive purposes. A larger portion of the SMME sector is said to have no access to adequate and appropriate forms of credit and equity or financial services.

The study by Bbenkele (2007) revealed that SMMEs especially those from rural areas have a poor understanding of the services that banks offer and they also lack understanding of the bank loan procedures. Bbenkele (2007) argues that this lack of information and knowledge leads to SMMEs' weak bargaining position in terms of interest paid, asset and liability disclosure, misuse of loan funds and generally bad preparedness when applying for business loans.

In an article, Christianson (2005) supports that SMMEs face problems in accessing finances. He asserts that SMMEs in South Africa are often quoted as not being able to access money from banks to grow their businesses. Inaccessibility of bank finance is seen as the biggest inhibitor of growth. The main problem facing the development of SMME's in both developed and developing countries is access to finance and this has also been supported by the work of Bosa (1969), Levy (1993) and Keasey and Watson (1994). Other commentators have however refuted this fact and feel that the problem is not really inaccessibility of bank finance but how SMMEs apply for finances. South Africa is included in this predicament as a developing country and the government has tried different options to improve accessibility of finance. Despite various government initiatives, many

SMMEs still have difficulties in accessing finance in South Africa.

Fin (2006) finds that only 2% of new SMMEs in South Africa are able to access bank loans. According to Foxcroft et al. (2002), 75% of applications for bank credit by new SMMEs in South Africa are rejected. This suggests that SMMEs without finance may not be able to survive and grow. According to Phillips and Wade (2008), SMMEs without access to finance may find it difficult to purchase necessary technology.

RESEARCH METHODOLOGY

Both primary data and secondary data were used to conduct this research. The research was conducted by the researcher moving from one business to another, distributing self administered questionnaires. The questionnaire was pre-tested before it was used to collect data. Data was collected from SMMEs in the Buffalo City Municipality, specifically East London in South Africa. The researcher used simple random sampling, a probability sampling technique in which each element has a known and equal chance of selection. This method also helps to eliminate bias in selecting sample elements. According to Cooper and Schindler (2006), it is the purest form of probability sampling.

Validity refers to whether an instrument actually measures what it is supposed to measure given the context in which it is applied. Babbie and Monton (2002) identify four major types of validity which are face validity, criterion related validity, content validity and construct validity. The researcher used the following steps to ensure the validity of the study as pointed out by Cooper and Schindler (2003): using a statistician, and a panel of experts to evaluate the research instrument for conceptual clarity, pre-testing the research instrument in a pilot study, using self-administered questionnaires which generally have a high response rate, and comprehensively reviewing the literature for theoretical constructs and empirical conclusions. Babbie and Monton (2002) point out that reliability is concerned with consistency of measures. The Cronbach's alpha was used as the measure of reliability.

The collected data was analysed by the Statistics Department at the University of Fort Hare. The packages which were used included the Statistical Analysis System (SAS) V8 for descriptive analysis. Statistica and SPSS are some of the packages that were used. The chi-square test for independence was used to test for association, and cross tabulation was also used to determine the distribution of respondents. Chi-square is used most frequently to test the statistical significance of results reported in tables (Barreira, 2004). According to Barreira (2004), chi-square allows for decisions about whether there is a relationship between two or more variables; if the null hypothesis is rejected, one can conclude that there is a statistically significant relationship between the variables.

RESULTS AND DISCUSSION

Population characteristics

A hundred and thirty two questionnaires were distributed and 109 of them were completed and returned. Of respondents, 55% were owners and 45% were managers. Sixty-two percent of respondents were male and 38% were female. Fifty one percent of respondents were owners or managers of small enterprises, 9% for medium enterprises and 40% owned or managed micro enterprises. Only 20% of these SMMEs managed to register in

Table 1. Impact of inaccessibility of bank finance on growth of SMMEs.

Growth effect	Frequency	Percent	Valid percent	Cumulative percent
Affected positively	6	5.5	5.5	5.5
Did not affect at all	8	7.3	7.3	12.8
Valid Affected negatively	57	52.3	52.3	65.1
Strongly affected negatively	38	34.9	34.9	100.0
Total	109	100.0	100.0	

a period of less than one year of operation. It took one to two (1 to 2) years for 45% of them to register and more than two years for the remaining 35% to formally register their businesses. Only 28% of SMMEs of these SMMEs had business plans. All respondents consider themselves financially literate but only 44% confirmed that they had adequate financial management skills. Seventy nine out of 109 (73%) SMMEs once applied for bank finance but only 8 (10%) managed to access it. Thirty (30) out of 109 SMMEs (28%) never applied for bank finance.

Reasons for not applying for bank finance

SMMEs (28%) that never applied for bank finances gave four main reasons. The majority (53%) said they did not know the procedures. Another 23% said they lacked knowledge on the sources of finance available at banks. Only 7% said high interest charged by banks discouraged them from borrowing. The remaining 17% had enough capital to start and run their businesses.

Reasons why SMMEs applications for finance were unsuccessful at banks

Twenty five percent (25%) of SMMEs that failed to access bank finance said they never got any response from banks clarifying why they could not offer them the much needed loans. Lack of financial deposit affected 17% of SMMEs that failed to access funds. It is lack of collateral security which proved to be the greatest obstacle in accessing finance by SMMEs, contributing 37%. Only 7% failed to access bank finance because they had poor business plans. The other reason why other SMMEs were not funded by banks was that their business ideas were said to be 'not viable'. The other reason is that there are no loans for foreigners since Khula does not guarantee loans given to non-South African citizens. Six percent (6%) of SMMEs that failed to access bank finance were foreign owned and that alone was a reason for them not to access finance. There are no SMMEs in East London that failed to access finances because of lack of financial management knowledge showing that this factor is not relevant in access to finance. It may however have impact on growth and survival.

Impact of lack of financial management knowledge on the accessibility of bank finance by SMMEs

SMMEs in East London are of the view that lack of financial management knowledge has an impact on access to bank finance. Only 12.8% admitted that it does not have any impact on access to bank finance. Over eighty six percent (86.2%), which is the majority, are of the view that it has affected their businesses negatively, especially when it comes to accessing funds, with one percent (1%) feeling they have been strongly affected.

Effects of inaccessibility of bank finance to the success and growth of SMMEs

The majority (76.1%) of respondents expressed their view of impact of inaccessibility of finance on survival of SMMEs revealing that it has a very negative impact. It is surprising that 11% of respondents said this had a positive impact on SMMEs. Nearly 13% argued that inaccessibility of finance had no impact on SMMEs in East London. 36.7% of respondents are of the view that it affects them negatively, yet, 39.4% are of the view that the impact is not only negative but also strong.

The majority (87.2%) of respondents said inaccessibility of bank finance had a negative impact on growth of their firms. Over seven percent (7.3%) on the other hand, argued that inaccessibility of finances never affected growth of their firms, yet, nearly 6% claim that this impacted the growth of their businesses positively. Table 1 shows summarised results from respondents on their view of the impact of inaccessibility of bank finance on the growth of SMMEs.

Results from respondents show that they view inaccessibility of finance as having a negative impact on growth. More than 86% said were affected negatively and this may mean that they are totally depending on bank finances, which is not advisable. They also have to make use of their retained earnings to grow or else, explore other options to fund the growth of businesses.

Lack of business skills, flexibility, skilled labour, innovation and flexibility in SMMEs in East London is attributed to inaccessibility of bank finance. Inaccessibility of finance has also affected SMMEs negatively in factors like transportation, information technology, exporting activities, visibility and also, relationships with suppliers.

According to Nieman and Nieuwenhuizen (2009), these factors contribute to the success of a business venture.

If SMMEs in East London make use of poor raw materials as shown by the results, the quality will obviously be below standard. If poor quality products are to be sold at a higher price, sales are most likely to be lost and in the long run, the business will fail.

Impact of lack of financial management knowledge on the success and growth of SMMEs

Lack of financial management knowledge has been said to have a negative impact by 75% of respondents. Of the remaining 25%, 18% said this strongly affected their businesses negatively. Only eight respondents (7%) argued that it never affected their businesses.

Lack of financial management knowledge also has an impact on investment decisions, survival of SMMEs, orientation towards the future, innovation, lack of business skills and SMME flexibility. Most, if not all of these factors, affect business success

The results showed that lack of financial management knowledge has a negative impact on investment decisions. Only 2.8% of respondents said it does not have an effect. At least sixty nine percent were affected negatively and the remaining 27.5% said it strongly affected them negatively. According to Nieman and Nieuwenhuizen (2009), and Correia et al. (2008), knowledge of financial management is crucial in making investment decisions.

Lack of financial management knowledge affected survival of the majority (73%) of SMMEs in East London negatively. About 24% of respondents were not affected at all. Only 2% said were affected positively with 1% saying it strongly affected the survival of businesses negatively. Nieman and Nieuwenhuizen (2009), point out that most SMMEs that fail to manage their finances will fail. Fatoki and Garwe (2010) agreed that lack of education and training is one of the major causes of failure in SMMEs in the Eastern Cape Province of South Africa.

Lack of financial management knowledge also affected SMME's orientation towards the future. Nieman and Nieuwenhuizen (2009) made it clear that successful entrepreneurs focus much on the future. Poor financial planning and management will lead to failure and no future. More than 80% of respondents indicated that they were affected negatively and were only focusing to achieve short term financial goals, not strategic goal of their ventures.

More than 70% of respondents indicated that lack of financial management knowledge did not affect their innovativeness. On the other hand, nearly 30% of respondents showed that this was limiting their entrepreneurial spirit and innovativeness.

Nearly 68% also showed that lack of financial management knowledge affects SMME flexibility especially in making financial decisions. Depending too much on consultants and experts will limit SMME flexibility in

making financial decisions that are crucial to the business. Nieman and Nieuwenhuizen (2009) stresses that SMME owners must themselves be able to interpret and understand financial statements.

The main challenges faced by SMMEs as a result of inaccessibility of finance include inability to expand or slow growth of businesses, inability to compete with bigger firms in the market, inability to employ skilled labour, failure to register, poor quality goods or services, poor marketing and bad reputation or images created.

Poor decision making leading to high failure rate and closure of businesses, failure to grow due to uninformed budgets, mismanagement of businesses, failure to access finance due to inadequate documentation and poor presentation are challenges faced by SMMEs because of lack of financial management knowledge.

Testing of hypotheses

The hypotheses were tested individually and the results are presented thus:

H₁: SMMEs in Buffalo City Municipality, South Africa find it difficult to access bank finance

A p-value (probability level) of 1.0 obtained from the test of association using the chi-square distribution is greater than 0.05 which means that we do not reject the null hypothesis (H₀). This means that SMMEs do apply for finance but it is not guaranteed that they will get it. In actual fact, if SMMEs cannot access finance through applying for it, it is very unlikely that there is another way of accessing it.

H₂: Inaccessibility of bank finance does not have greater impact on survival of SMMEs

A p-value (probability level) of 0.042 obtained from a test of association using the chi-square distribution is less than 0.05 and this means we reject the null hypothesis for there is an association between these two factors. These findings are in line with those of Fatoki and Garwe (2010), who said that SMMEs in East London fail because of inaccessibility and lack of finance. Nieman and Nieuwenhuizen (2009) agree that an acceptable and disappointingly large number of SMMEs fail during the first years of operation mainly because of inaccessibility to or lack of finance. Nieuwenhuizen and Groenewald (2004) also highlighted that inaccessibility of finance is a serious constraint during the formation of ventures as well as at later stages as businesses require additional cash flows. Inaccessibility of finance can justify the reasons for high failure rate of SMMEs in East London.

H₃: H₀ Inaccessibility of bank finance does not have greater impact on growth of SMMEs

A p-value (probability level) of 0.032 obtained from a test

of association using the chi-square distribution is less than 0.05 (5%) which means that there is an association between these two factors. Pearson product moment correlation (r) of 0.65 is closer to 1 and shows that there is a very strong positive correlation and we reject the null hypothesis. These results are in line with those of Nieuwenhuizen and Groenewold (2004) who found that inaccessibility of bank finance is a serious constraint during the formation of new ventures as well as at later stages as businesses require additional inflows of capital to support expansion and growth. Without access to bank finance SMMEs will hardly grow. All businesses require financial resources in order to start trading and to fund growth (Fatoki and Garwe, 2010). According to Cassar (2004), lack of access to finance can be a constraint on business growth.

H_4 : H_0 Lack of financial management knowledge does not have an effect on access to bank finance

A p-value (probability level) of 0.33 obtained from a test of association using the chi-square distribution is far greater than 0.05 and this means we do not reject the null hypothesis (H_0). This will mean that inaccessibility to finance by SMMEs in East London may be attributed to factors other than financial management knowledge. Factors that may be having an impact include lack of collateral security, lack of information, and also lack of support from institutions like Khula and the government. According to Mutezo (2005), poverty and lack of assets indicate that many SMMEs do not have collateral needed to access finance. Foxcroft et al. (2002) also stress the fact that collateral is a problem to the bulk of disadvantaged entrepreneurs in the SMME sector. According to Mutezo (2005), although support providers are in place, SMMEs through either ignorance or lack of information can still remain unknowledgeable about the availability and accessibility of financial resources.

These results are in line with an investigation into the programmes being used in South Africa to develop the SMME sector by Pretorius and Van Vuuren (2003). Their research found that the core focus of the programmes from Khula and SEDA are more relevant to larger and existing businesses than for small businesses and start ups. They argued that there is a general tendency of Khula and Department of Trade and Industry programmes to focus on larger and existing ventures as their target audience and very few of their programmes are aimed at micro and small enterprises.

MANAGERIAL IMPLICATIONS AND RECOMMENDATIONS

The following are key findings of this research:

i. Although lack of financial management knowledge has no impact on the accessibility of bank finance in East

London, it affects SMMEs severely on survival and success. Most SMMEs fail because of lack of financial management knowledge.

ii. There are other factors other than lack of financial management knowledge that affect SMMEs' access to finance.

iii. Inaccessibility of finance does not have a greater impact on growth of SMMEs. This is mainly because after SMMEs are established, they can seek other sources of finance other than bank finance.

iv. Although Khula Enterprise Finance and SEDA may be delivering their services, SMMEs in East London are not aware of the services and help they can get from these organisations

Based on the findings of this study, the following recommendations are suggested.

SMMEs

Inaccessibility of bank finance and lack of financial management knowledge are real challenges to SMMEs in East London. SMMEs however, ought to understand that they are responsible for their own success or failure. SMMEs need to take time to explore all financing opportunities and also how they can gain more financial management knowledge. It is SMMEs that are supposed to look for institutions that support them, not the other way round. SMMEs also need to show seriousness when applying for bank loans and in preparing business plans. Making use of experts at their disposal (Khula and SEDA) can help ease the problem of inaccessibility to finance.

Financial literacy trainings offered to SMMEs in the Eastern Cape Province need to be taken seriously. These trainings are of benefit for they can help ease other challenges affecting SMMEs, especially lack of financial management knowledge and access to finance. Inaccessibility of bank should not kill the entrepreneurial spirit. SMMEs should now not depend only on bank finance. They can explore other options to grow and start businesses. Money from family, friends and fools can work for their good for it is usually interest free. SMMEs need to realise that their success is dependent on what they want to achieve and how they plan to achieve it, not on banks or the government. This is why some SMMEs are excelling while others are failing even if they are operating in the same area and doing the very same business.

The government

The majority of SMMEs are not aware of government initiatives that are meant to improve the SMME sector. There is a need to educate SMMEs on useful government services and how they can access them. The government should also monitor the services offered to SMMEs by banks. Although the government has a role to

play, it has to be careful not to create a spirit of dependency for it destroys the entrepreneurial spirit in SMMEs. SMMEs need to be supported but must not be allowed to be over dependent on the government.

Banks

Although it is sometimes suggested that SMMEs can explore other financing alternatives, bank finance remains common and useful to them. Banks need to realise that their actions and attitude towards SMMEs has an effect on SMMEs and the nation at large. Banks should not just turn down SMMEs' applications for finance without explanation.

SEDA and Khula enterprise finance

Although they may be working hard, SEDA and Khula are very invisible on the ground. Their services are crucial to develop the SMME sector yet very few SMMEs know where to locate them. Some SMMEs do not even know the role of these organisations. It is suggested that massive road shows targeting SMMEs will help SEDA and Khula to be visible and at least effectively help to develop the SMME sector in the Eastern Cape Province. Working with universities and schools will also help improve awareness of their services to the general public. Khula and SEDA need to also extend their services to non-South Africans who own businesses in the republic for they are equally important in terms of employment creation. Although Khula have created working relationships with commercial banks, effective monitoring on whether banks are really offering loans to SMMEs is still crucial.

LIMITATIONS OF THE STUDY

The study was limited to SMMEs in the Buffalo City Municipality. The study concentrated only on one municipality in the Eastern Cape Province of South Africa. Because of the limitations pointed out, care should be exercised in the interpretation and application of the results of this study and the generalisation of the findings to the whole province or country.

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Full Length Research Paper

The effect of organizational support, self efficacy, and computer anxiety on the usage intention of e-learning system in hospital

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The purpose of the study is to develop the usage intention model of e-learning systems. A survey of 1071 samples of six teaching hospitals in Taiwan shows that the effects of organizational support, self efficacy, and computer anxiety on usage intention are mediated by perceived ease of use, and perceived useful. According to the statistical results, the proposed model fits very well for the samples. Besides, both self efficacy and computer anxiety are important antecedents of perceived ease of use, and perceived useful. Also, organizational support has significantly influence on perceived ease of use. In addition, perceived ease of use has the most influence on usage intention, followed by perceived useful. Further investigation reveals that organizational support, self efficacy, and computer anxiety all have indirect influences on usage intention. This research can provide e-learning designers and managers of the hospital with the implication that we must focus not only on the technological aspect (perceived ease of use and perceived useful), but also on the social psychological aspect (organizational support, self efficacy, computer anxiety).

Key words: E-learning, organizational support, self efficacy, computer anxiety, perceived ease of use, perceived useful.

INTRODUCTION

In the era of information explosion and with the progress of technology, the information system combines internet and breaks the limit in time and space, effectively reducing the educational training cost, and becomes a learning approach in the new century. As far as the medical institution is concerned, the Department of Health in Taiwan regulates that medical professionals should receive continuing education during their practices and that they must meet the requirements of earning all the required credits. The intention for the Department of Health to establish this norm is nothing more than, by means of such a norm, medical professionals who control people's health can be reminded that they must form a habit of continuously receiving the latest knowledge and

information to further benefit patients and the public. However, most of the relevant medical professionals fail to have further studies at the fixed time due to their work schedule. Therefore, with the low-cost, timeliness, flexibility and convenience of online learning, relevant medical professionals can obtain more learning opportunities and learning initiatives.

Using information and communication technologies, e-learning has emerged as the innovative education style. The great advantage of using such technology in connection with on-site is that it increases flexibility, through resources that facilitate learning, anytime and anywhere (Liaw, 2008). The contents of instruction include text, graphics, audio, video, and so on. Recently, many businesses have invested many resources to build up e-learning systems to better manage their workforce. The healthcare industry is knowledge intensive by nature because a large proportion of employees in healthcare

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organizations are knowledge workers, such as physicians, nurses, pharmacists, radiologists, physical therapists etc. By using available e-learning system effectively, healthcare knowledge workers can reduce travel cost and learn the newest medical knowledge online. Therefore, e-learning systems have been widely employed in health institutions in Taiwan.

The high competitive environment leads to the implement of e-learning in health institutions. To reinforce the professionalism of knowledge workers in hospitals, managers must try their best to improve their original systems by enhancing system processing capabilities and employees' usage intention. Also, users' acceptance is the most important determinant of continuance intentions when using this technology (Roca and Gagne, 2008). Accordingly, the purpose of this study is to investigate the factors that affect employees' usage intention in e-learning, and to find out the important antecedents so as to offer an empirical reference to the managers of hospitals.

LITERATURE REVIEW

E-learning

E-learning adopts the digital learning approach to offer fast learning by electronic teaching contents through the internet technology. Under the strategy of individualized teaching, it can increase the motivation of learning, making learning anytime and anywhere possible by surfing the internet, and can share the knowledge. Employing the features of information network, e-learning can integrate the contents of training courses and multimedia material to offer individual learning or group learning without being restricted by both traditional classrooms and fixed class schedules. Long and Stevenson (1999) indicate that e-learning transmits the computer-based instruction via the internet, allowing learners to obtain knowledge by taking advantage of training methods presented by the media such as the internet browser, no matter what computers (personal or public) they use. Besides, it enables improvements in communication efficiency, between students and teacher, as well as among students (Martines and Kellermanns, 2004). Furthermore, Rosenberg (2001) also argued that e-learning has several benefits: (1) it lowers cost, (2) its content is more timely and dependable, (3) it is a just-in-time learning approach, (4) it builds universal communities, and (5) it provides an increasingly valuable learner service.

Theory of reasoned action (TRA) and technology acceptance model (TAM)

The theory of reasoned action (TRA) is developed to

predict and explain human beings' consciously intended behavior in social psychological field (Fishbein and Ajzen, 1975). According to TRA, an individual's specified behavior is determined by behavioral intention to perform the behavior, whereas, the intention is jointly determined by the person's attitude and subjective norm concerning the behavior. The attitude toward behavior is an individual's evaluative affect about performing the behavior, and the subjective norm is an individual's perception that important referents of him think he should or should not perform the target behavior.

The technology acceptance model (TAM) adapts the original TRA to predict and explain a person's adoption of information technology (Davis et al., 1989). TAM identifies two relevant beliefs, that is, perceived ease of use and perceived usefulness. Perceived ease of use is defined as the extent to which an individual believes that using the system will be free of effort, while perceived usefulness is defined as the extent to which an individual believes that using the system will enhance the job performance. According to TAM, the usage of information technology is influenced by behavioral intention to use the information technology, while behavioral intention is determined jointly by perceived usefulness and attitude toward information technology usage. Besides, the attitude toward information technology usage is jointly determined by perceived ease of use and perceived usefulness. Also, perceived usefulness is influenced by perceived ease of use and external variables. TAM has been widely applied in practice, extended in academics, and empirically tested in the field of information management in the last decade.

Organizational support, self efficacy, and computer anxiety

Perceived organizational support (POS) refers to employees' perception concerning the extent to which the organization values their contribution and cares about their well being (Eisenberger et al., 1986). The higher organizational support employees perceive, the lower the absence rate is. Perceived organizational support theory is a very important perspective in organizational behavior literature. Rhoades and Eisenberger (2002) argues that employees who perceive higher organizational support will find their job more pleasurable, be in a better mood performing their tasks, and suffer fewer strain symptoms like anxiety.

Ein-Dor and Segev (1986) contend that if information system was supported and promised by various ranks of managers, users and designers will feel positive. Both users and designers will believe that they will be highly valued by the managers and supervisors and win the priority of sufficient financial support.

Davis et al. (1989) propose that organizational support is an important factor to affect perceived usefulness.

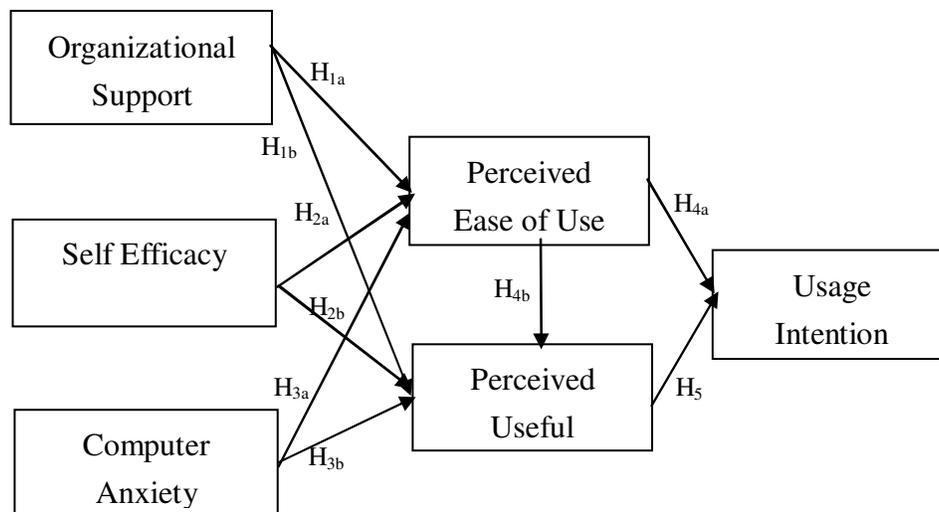


Figure 1. The proposed research model.

Other studies also indicate that organizational support is positively related to perceived ease of use, perceived usefulness, perceived enjoyment, and subjective norm (Igbaria et al., 1996). In addition, previous study has shown that senior management support has a direct impact on training transfer performance (Lim et al., 2007).

Compeau and Higgins (1995) defined self efficacy as “a judgment of one’s capability to use a computer”. Venkatesh and Davis (1995) defined self efficacy as “judgments of how well one can execute courses of action required to deal with prospective situations”. According to Venkatesh and Davis’s findings, computer self efficacy is the important determinants of perceived ease of use. In online training environment, computer self-efficacy is also an important trainee characteristic for e-learning situations (Chau and Wang, 2000). Lim et al. (2007) also found that self efficacy has a positive impact on learning achievement of e-learning.

Computer anxiety refers to an individual's anxiety aroused in the process of using or facing the computer. Computer anxiety has significant influences on an individuals' intention to use the computer. The cause is mainly that an individual's unfamiliarity with the computer makes him worried that he might appear clumsy in front of others or worried that his ignorance may cause damage to the computer. Hence, it is learned that computer anxiety results from the individual's unfamiliarity with the computer and develops the anxious state accordingly. Computer anxiety which belongs to situational anxiety can be improved by proper computer training or increasing computer experiences.

The causes of computer anxiety include: (1) individuals dread to cause damage to the computer and are also worried that they may make mistakes, (2) the uneasiness in the mind which result from individuals' feeling ignorant or awkward when they interact with the computer, (3) the

fear of computer is reflected from the fear of technology or math, (4) individuals are worried that radiation might affect them and cause their health to deteriorate when they work in front of computer, (5) the fear that individuals have toward new or unfamiliarity things leads to the fear of computer technology, (6) individuals are worried that the computer will make a threat to or limit their development of intelligence, (7) individuals feel troubled that the time to use computer is so insufficient that they fail to take care of relevant matters with the pre-scheduled time and cause the state of psychological uneasiness, (8) some individuals consider themselves inferior to computer in intellectual development and they also often tend to give up the opportunities of independent thinking (Doronina, 1995).

Computer anxiety is associated with negative perceptions about computers, problems in playing with them, and avoidance of the technology (Igbaria and Iivari, 1995). Igbaria et al. (1996) proved that computer anxiety is negatively related to computer usage, perceived usefulness, perceived enjoyment, and social pressure. Also, van Raaij, and Schepers (2008) have shown that computer anxiety has direct effects on perceived ease of use.

Based on the review of the literature, Figure 1 presents the conceptual framework from which the proposed research model is formed.

RESEARCH METHODS

We adopted the questionnaire survey for data collection, and examined our hypotheses by applying the structural equation modeling (SEM) method to validate the model. The measurement instruments for variables in the questionnaire were developed from previous studies to enhance the variability and reliability. Responses to the various variables related to the perceptions of the individual

Table 1. Results of confirmatory factor analysis.

Construct	Cronbach's α	Composite reliability	Average variance extracted
Organizational support	0.91	0.91	0.78
Self efficacy	0.70	0.80	0.51
Computer anxiety	0.93	0.93	0.83
Perceived ease of use	0.90	0.90	0.75
Perceived useful	0.87	0.88	0.72
Usage intention	0.90	0.90	0.76

subjects were measured using Likert-type scale.

We mail the invitation letters to the executives of hospitals to express our need for the research purpose. Of these hospitals contacted, six teaching hospitals (located in eastern, northern, central, southern Taiwan) were willing to participate in the survey. The survey was conducted to a convenient sample of 1300 employees for two months. Of the 1300 samples, the samples with incomplete responses and missing data were deleted. Finally, the eligible samples of 1071 employees were yielded, and the total response rate is 82.38%.

RESULTS

The data analysis proceeds according to the two-step approach recommended by Anderson and Gerbing (1988). First, we assess the measurement model which consists of the seven latent factors, includes the assessment of reliability, discriminant validity, and convergent validity of the scales. Second, we validate the structural model which represents the series of path relationships linking the seven constructs.

Sample characteristics

Of these respondents, 901 respondents are women (84.1%), 41.7% are age 30 and below. Most respondents are at the age group of 21 to 30 years (41.7%). Most respondents hold bachelor's degrees (85.8%). A majority of the respondents are nurses (43.8%). Most respondents lived in northern Taiwan (49.8%). The times of using the e-learning is mostly ≥ 1 per week (52.3%).

Measurement model results

To validate the measurement model, three types of validity were assessed: content validity, convergent validity, and discriminant validity. Content validity was done by interviewing senior system users and pilot-testing the instrument. And the convergent validity was validated by examining Cronbach's α , composite reliability and average variance extracted from the measures (Hair et al., 1998). As shown in Table 1, the Cronbach's α of every subscales range from 0.70 to 0.93, which are above the acceptability value 0.7 (Nunnally, 1978). Besides, the composite reliability values range from 0.80 to 0.93, and

the average variances extracted by our measures range from 0.51 to 0.83, are all within the commonly accepted range greater than 0.5 (Hair et al., 1998). In addition, all measures are significant on their path loadings at the level of 0.001. Therefore, the convergent validities of all six constructs are confirmed.

Besides, according to Fornell and Larcker (1981), discriminant validity can be tested among all constructs by comparing the average variance extracted (AVE) of each construct with the squared correlation of that construct and all the other constructs. All squared correlations between two constructs are less than the average variance extracted of both constructs. Therefore, the results confirm that the discriminant validity of constructs in the study is satisfactory.

Structural model results

To validate the measurement model, we used AMOS 6.0 to assess the analysis. As shown in Table 2, the goodness-of-fit indices are within accepted thresholds. Generally, these fit indexes are all greater than or equal to 0.9 for GFI, AGFI, NFI, and CFI. Besides, $\chi^2 / \text{d.f.}$ value is less than 5 and RMSEA value is less than 0.08. Accordingly, the summary of the overall goodness-of-fit indices indicate a reasonable fit of the model and data.

Figure 2 illustrates the results of the structural model with the estimated standardized path coefficients and path significance among constructs (non-significant paths as dotted lines). As predicted, all proposed hypotheses are supported. The results of the structural model show that both technological factors (perceived ease of use, perceived useful) and social psychological factors (organizational support, self efficacy, and computer anxiety) are key aspects affecting usage intention of e-learning. The results also demonstrate that social psychological factors have significant impact on usage intention mediated by perceived ease of use and perceived useful.

DISCUSSION

Based on TAM model, this study proposed a research model to better understand the hospital employees' usage intention of health websites. The model considered the relationships among technological factors (perceived

Table 2. Fit indices for the structural model.

Structural model statistic	Fit index	Recommended threshold
χ^2	717.705	-
$\chi^2 / \text{d.f.}$	5.019	< 8
GFI	0.93	> 0.9
RMSEA	0.061	< 0.08
AGFI	0.91	> 0.9
NFI	0.95	> 0.9
CFI	0.96	> 0.9

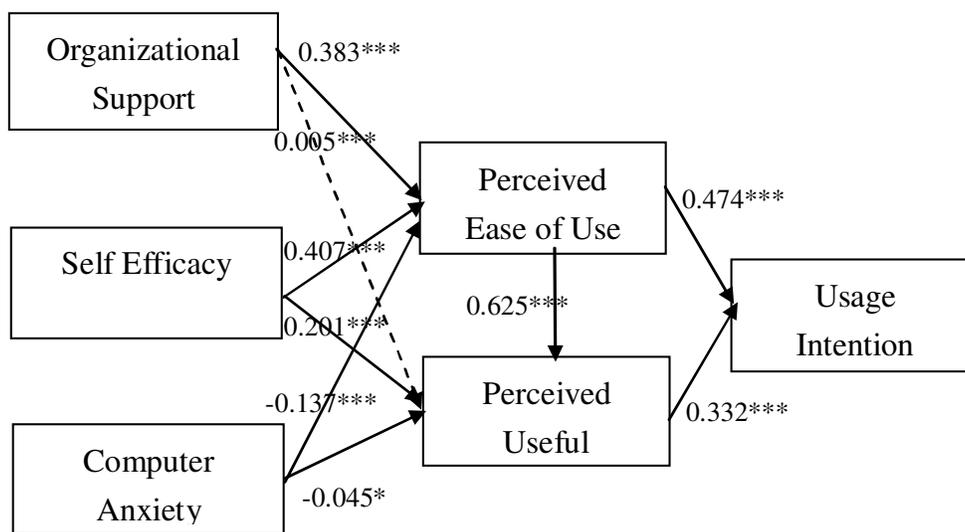


Figure 2. Final proposed model.

factors (organizational support, self efficacy, and computer anxiety). Moreover, the model aims to interpret that not only technological factors, but also social psychological factors are important determinants of e-learning adoption.

By including the social psychological factor in e-learning adoption model, the proposed model extends beyond traditional IT-based view of e-learning systems, and can provide academics and practitioners with better assessment of e-learning systems. This research can provide e-learning designers and managers of the hospital with the implication that we must focus not only on the technological aspect (perceived ease of use and perceived useful), but also on the social psychological aspect (organizational support, self efficacy, and computer anxiety).

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Full Length Research Paper

Trust and security of electronic banking services in Saudi commercial banks: Saudis versus Non Saudis opinions

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This paper reports on research conducted in the Kingdom of Saudi Arabia. The research examines the trust and the security of electronic banking services in Saudi commercial banks. The design for the study used quantitative research methodology. Data were collected by means of questionnaires utilizing snowballing approach. 500 Questionnaires were distributed to banks' respondents including Saudi and Non Saudi banks' customers. The quantitative data presented very strong evidence to support both hypotheses that: *there are significant trust differences between Saudis and Non Saudis in their use of electronic banking services comprising ATM, Credit cards, Mobile SMS, Phone and the Internet banking (p-value 0.001, 0.006, 0.004, 0.000 and 0.033 respectively); and also that: there are significant security differences between Saudis and Non Saudis in their use of electronic banking services including ATM, mobile SMS, phone and the internet banking services (p-value 0.000, 0.000, 0.000 and 0.006, respectively).* Findings revealed how Saudi banks' customers have very high trust in using the electronic banking services and also how Saudi banks' customers strongly believed that the electronic banking services are more secure compared with their counterpart the Non Saudis. The study presents new empirical evidence, and enhances our understanding on the trust and the security of electronic banking technology in a Middle East country. The implication of this study will be vital in helping Saudi banks' managers to assess and identify methods of improving the trust and the security of electronic banking services offered.

Key words: Electronic security, information technology, e-services trust, technological change, electronic banking, developing countries, Middle East, Saudi Arabia.

INTRODUCTION

This study reports on research that was conducted in the Kingdom of Saudi Arabia (KSA) to examine the trust and the security of electronic banking services in Saudi banks. Saudi Arabia is the world's largest producer and exporter of total petroleum liquids, and the world's second largest crude oil producer. The KSA holds more than 20% of the world's proven oil reserves, and plays a leading role in OPEC. Saudi Arabia's economy remains heavily dependent on oil and petroleum-related Industries, including petrochemicals and petroleum refining (EIA, 2011). Initial investigation reveals insufficiency of research in the field of management of information technology (IT) and change in developing countries and that there is little information about trust and security of

electronic banking services in Saudi commercial banks. In general, banks operate in an information system context whereby financial institutions are critically dependent on information technology activity for their daily operations. However, selecting one industry sector such as Saudi banking industry, rather than different industries, offers some advantages to research since respondents in the same industry are working in similar surroundings and are more likely to have similar skills and backgrounds that may promote homogeneity of data. Saudi banking industry in the Eastern Province has been identified as an industry that plays a crucial role in the economic development of the Kingdom of Saudi Arabia as well as providing valuable electronic banking

services to both indigenous people and huge number of expatriates residing and working in the Eastern Province of the Kingdom.

This study focuses on investigating and presenting findings on trust and security of electronic banking services in Saudi banking sector. The research compares Saudi banks customers' opinions with their counterpart the Non Saudis on trust and security of electronic banking services in the commercial banking sector of Saudi Arabia in the Eastern Province. The implication of this study will be critical in helping Saudi banking practitioners to assess and identify methods of improving trust and security of electronic banking services in Saudi banking industry. The study begins with research objectives, briefly examines literature on IT, security and trust, followed by research methodology, then presents findings and discussion and closing with conclusion.

Research objectives

The paper objectives were set to examine trust and security of electronic banking services in Saudi commercial banks. The study aims at assessing both the degree of trust and security among banks' customers on the electronic banking services comprising ATMs, credit cards, telephone banking, mobile SMS, and Internet banking services in the Easter Province of the Kingdom including Dhahran, Khobar, Dammam and Jubail.

The design for the study used research methodology which included quantitative technique. Data were collected by means of distributing questionnaires to bank respondents including both Saudi and Non Saudi banks' customers through snowballing approach. Statistical Package for Social Scientists (SPSS) for Windows package was employed for the analysis of the data collected from the survey. The method of analysis consisted of descriptive statistics including mean, variance and frequencies. The researcher used independent-samples t-test to test for statistical significance of the research hypotheses.

In completion, it is hoped that the study enhances the understanding of academicians, professional managers and banking practitioners alike of the trust and the security of electronic banking services in a banking sector of a developing country such as Saudi Arabia.

LITERATURE REVIEW

The literature review examines studies on information technology (IT) and change in the banking industry including trust and security of electronic banking services. In the last decade, computer-based information technology (IT) had become essential in most organizations, and had a major influence on the development of electronic services in the banking industry all over the

world. The increase use and rapid developments of information technology enabled fundamental changes in how companies including banks interact with customers (Dabholkar and Bagozzi, 2002; Parasuraman and Zinkhan, 2002, Bauer et al., 2005). Whether banking organizations are newly established or fully mature, they maintain their vitality by innovating, changing, and learning from their experiences (Hellriegel, et al., 2005; Slocum, et al., 2008). Although information technology has attracted a number of academic researchers and banking practitioners alike (Zeithaml, 2002; Zeithaml et al., 2002; Zhang and Prybutok, 2005; Lee and Lin, 2005; Bauer et al., 2005), there is still a considerable gap of knowledge on the issue of electronic banking services and the wider issue of technological change in the banking industry of developing countries (Parasuraman and Zinkhan, 2002). This relative lack of knowledge is particularly a problem to companies seeking to meet customer expectations and requirements by offering consistently high, favourably perceived service standards of electronic banking services in a rapidly changing technological environment. As such, employment of IT is a major challenge facing business organizations seeking to sustain competitive advantage in dynamic business markets including commercial banking sector. This challenge is more complex in developing countries particularly in the Middle East where business organizations deal with problems such as inadequate investment, and lack of involvement in the management process of new technology and change (Mahdi and Dawson, 2007).

The history of technology in banking highlights how IT has changed the methods by which the banking sector operate, for instance, 50 per cent of foreign exchange business trades are carried out through IT (Childs, 1994). International banks as Harris (2001) points out are considered to be large investors in technology. Moreover, worldwide banks have invested heavily, for example, in telecommunications networks and SWIFT to link overseas branches with their headquarters in order to enable banks to effectively communicate business across the globe regardless of time and distance (Dixon, 2002; Marlin, 2004). As the banking external environments become increasingly competitive and turbulent, the most effective organizations would be those that build change, innovation, and learning into their normal operations (Hellriegel et al., 2005; Slocum et al., 2008). However, the issue is no longer a question of whether IT is used or not, rather the issue is how best it is efficiently used for sustainable and competitive advantage. The vast majority of people who uses banking technology such as ATM and or the Internet, for instance, can fully understand this. Moreover, the improvements in the trust and the security of electronic services are not merely appreciated by customers, but have become very important to effectively utilization of information banking technology.

Prior to the development of a conceptual framework for this study, it is important to define electronic banking

services. The current literature lacks a comprehensive definition of electronic and or automated service. Electronic banking in its simplest form may mean the provision of information about the bank and its products by means of a page on the Internet. Daniel (1999) defines the term as 'the provision of information and or services by a bank to its customers via computer, telephone or television'. A more developed service, in Daniel's (1999) view, is one that provides the customers with the opportunity to gain access to their accounts, carry out transactions or buy products online or using other electronic means such as TV, telephone or automated teller machines (ATMs). This research, draws on Daniel's (1999), as it provides a more general definition of automated banking services that can be extended beyond ATMs, telephone and Internet banking as they are not the only automated services in the banking industry. This study would suggest that electronic banking services include ATMs, SWIFT, credit cards, telephone banking, mobile SMS, interbranch online, and Internet banking services.

Therefore, the study defines electronic banking services as 'the provision of information and or services by a bank to its customers through ATMs, SWIFT, credit cards, telephone banking, mobile SMS, interbranch online, and or Internet banking services'.

CONCEPTUAL FRAMEWORK

In developing a framework to study trust and security of electronic banking services in Saudi banks, the initial literature review reveals a number of models which can fit with this study including Technology Acceptance Model (TAM), was developed from Theory of Reasoned Action (TRA) by Davis (1989); Technology Acceptance Model (TAM2) was developed by Venkatesh and Davis (2000); the Unified Theory of Acceptance and Use of Technology (UTAUT) was introduced by Venkatesh et al. (2003) with four core determinants of intention and usage, and up to four moderators of key relationships. The UTAUT was formulated by theorising four constructs to play an important role as direct determinants of user acceptance and usage behaviour (Kripanont, 2007). The extended TAM was further developed by Al-Sukkar (2005), and further developed by Al-Somali et al. (2009) with four core dependent variables of intention and usage comprising: *Perceived Usefulness, Perceived Ease of Use, Attitude Towards Use, Actual Usage*, and number of independent control variable including *Quality of electronic services, Age, Gender, Education, Income, Trust, and Culture* (Al-Sukkar, 2005; Al-Somali et al., 2009). However, Al-Sukkar (2005) and Al-Somali et al. (2009) research in Jordan and the Kingdom of Saudi Arabia respectively, could be considered as more fitting with this study, and that there are a number of elements that the researcher can draw upon from these models. In

studying trust and security of electronic banking services the demographics such as *age, gender, education, and income* are also taken into consideration and included into the framework as briefly discussed as follows:

1. Demographics: are the characteristics of a work group, an organization, a specific market, or various populations, such as age, gender, education, occupation, and income. Demographics play an important role in marketing, advertising, and human resources management (Slocum, et al., 2008). The review of the literature reveals that a typical user of online banking or Internet banking services can be classified as a highly educated, relatively young and wealthy person with a good knowledge of computers and especially the Internet (Karjaluo et al., 2002, Al-Ashban and Burney, 2001) whereas having a good job and or occupation was not found significant. Many studies recognise that demographic characteristics impact on customer attitudes and behaviour concerning online banking (Alagheband, 2006; Lai and Li, 2005; Lassar et al., 2005; Eastin, 2002; Burke, 2002; Lee and Lee, 2001; Sathye, 1999).

2. Trust: is the customers' confidence in the bank's integrity and effectiveness in providing better electronic banking services to its users. Many researchers agree that trust is vital in online banking compared with offline banking as transactions of this nature contain sensitive financial information and people involved in the financial transaction have the feeling of insecurity about their access to important files and information transferred through the Internet such as credit card details (Alsajjan and Dennis, 2006). Further, Suh and Han (2002) consider the issue of trust as very important in online compared with offline banking. Customers' trust in their online transactions is important and has been identified as a key to the development of e-commerce (Yousafzai et al., 2003). We would assume that the feeling of insecurity or the lack of trust is common among bank customers, and therefore, the researcher would formulate the first hypothesis that *there are no significant trust differences among banks' customers in their use of electronic banking services*.

3. Security: Is the protection of bank customers when using the online banking transactions through single password authentication, as is the case in most secure Internet shopping sites, is not considered secure enough for personal online banking applications in some countries. Electronic banking enables customers to handle their financial transactions from their own personal computers (PCs) or laptops that are connected to Internet. Customers can also use their cell phone, for example, to check their balance, transfer funds and pay bills. The ease of access and the convenience in using electronic banking services allow bank customers to conduct their banking transactions without having to speak to a customer service agent or visit their bank branch. Nonetheless, a number of security issues need to

be considered when using electronic banking services comprising identity theft, security breaches by Hackers. As a result, it is important in order to ensure the confidentiality of information and that it is not being manipulated or compromised by Hackers, banks need to adopt many security measures to ensure that customers information is protected (Quovardis, 2010). Basically there exist a number of different security methods for online banking including Personal Identification Number (PIN) system which represents a password used to login. Whereas Transaction Authentication Number (TAN), representing one-time passwords to authenticate financial transactions. TANs are a second layer of security above and beyond the traditional single-password authentication. TANs are supposed to give additional security since they operate as a way of two-factor authentication. Should the actual document or token containing the TANs be stolen, it will be of little use without the password. In contrast, if the login data are acquired, no transactions can be performed without a valid TAN (Riyad Bank, 2011). For additional security, the customer login requires authentication for reconfirmation of his identity. The most secure way of using TANs is to generate them by need using a security token or authentication using Mobile (Riyad Bank, 2011). As such, we would propose the second hypothesis that *there are no significant security differences among bank customers in their use of electronic banking services.*

Electronic banking services bring a radical change in the way commercial banks develop and maintain close relationships with their customers. The introduction of banking technology has made customers utilization of electronic banking services very significant. The study need to compare trust and security of electronic banking services in Saudi banks in considering both Saudi indigenous and Non Saudi expatriates, taking into account the demographics comprising age gender, education, and income. The study focuses on comparing trust and security of electronic banking services comprising ATMs, credit cards, telephone banking, mobile SMS, and Internet banking services between Saudis and Non Saudis.

METHODOLOGY

In collecting primary data from financial institutions, the researcher was aware that access issues pose constraints particularly when seeking information related to personnel, customers, investors and or financial data (Saunders et al., 1997, 2009). This study was necessarily exploratory as gaining access to banks in a complex environment of a developing country such as Saudi Arabia was a major research challenge (Al-Ashban and Burney, 2001; Sohail and Shaikh, 2007). As a result, the researcher used snowballing technique for data collection and closely worked to overcome problems of access in using his personal contacts as Bryman (2004, 2006, 2008) suggests a number of strategies for gaining access such as using friends, contacts, colleagues, and academics to help in gaining entry, in addition to getting support of a person within the institution to act as a promoter or a supporter (Bryman,

2006, 2008; Bryman et al., 2008, Mahdi, 2008).

To achieve the study objectives, a framework for data collection and analysis was used based on quantitative approach. Data were collected by means of snowballing technique. The snowballing technique is often used in populations which are difficult for researchers to approach such as the case of the females and the bank staff in Saudi Arabia. Questionnaires were distributed through employment of undergraduate research assistants to banks' respondents including Saudi and Non Saudi banks' customers. The quantitative approach aimed at testing the following null hypotheses:

1. That there are no significant trust differences between Saudis and Non Saudis in their use of electronic banking services in Saudi banks.
2. That there are no significant security differences between Saudis and Non Saudis in their use of electronic banking services in Saudi banks.

These hypotheses were addressed in data collected by the use of a questionnaire to provide quantitative data and an open ended question to provide qualitative data in seeking banks respondents' opinions. Questionnaire was formulated by reviewing relevant empirical studies so as to identify key variables and constructs based on the literature. Pilot study was conducted by testing and pre-testing the questionnaire in consultation with experts and 50 randomly selected banks' respondents. Feedbacks were incorporated and questions were then revised and refined. The final version of the questionnaire consists of 21 closed questions and one open ended question placed at the end of the questionnaire to allow for further comments and provide qualitative data in seeking banks respondents' opinions. Snap10 was used in the design of the questionnaire. Consequently, 500 copies of the questionnaire were distributed to bank respondents including faculty, managers, technicians, clerks, workers and students in Dhahran, Khobar, Dammam and Jubail, which are considered the four big cities in the Eastern Province of the Kingdom of Saudi Arabia. The process of distributing and collecting data took six months. Eventually, 418 completed questionnaire copies were collected from respondents. Data were then filtered and 36 copies of questionnaire containing missing data were excluded from data entry, leaving 382 clean and fully completed questionnaire copies which represented 76.4 response rate. Reliability statistics test was conducted which yielded Cronbach's Alpha 0.786 and Cronbach's Alpha 0.754 based on standardized items (17 items) with an item mean score of 3.869. Questionnaire data were used to deduce the validity of research hypotheses in collecting responses from a pre-set series of questions (Bryman, 2008; Mahdi, 2008).

Initially, the study compared views of Saudi banks' customers against the Non Saudi banks' customers. The respondents' different viewpoints in trust and security of electronic banking services formed the basis for comparison and evaluation. The Statistical Package for Social Scientists (SPSS) for Windows package was utilised for the analysis of the data collected from the survey. The researcher used the means, variances and frequencies, in addition to independent-samples T-Test to test for statistical significance of the research hypotheses (Kinnear, and Gray, 1999: 171).

RESULTS AND DISCUSSION

Respondents' general profile

The findings from the study on trust and security of electronic banking services in Saudi banks are presented

Table 1. Respondents' demographics.

Demographic	Saudis (175)		Non Saudis (207)		Total (382)	
	N	Percent	N	Percent	N	Percent
Nationality	175	45.8	207	54.2	382	100
Gender						
Male	159	90.9	185	89.4	344	90.1
Female	16	9.9	22	10.6	38	9.1
Relationship with banks						
Bank customers	147	84	201	97.1	348	91.1
Bank staff	28	16	6	2.9	34	8.9
Age group						
Under 20	2	1.1	0	0	2	0.5
20-29	70	40	22	10.6	92	24.1
30-39	61	34.9	60	29	121	31.7
40-49	32	18.3	69	33.3	101	26.4
50-59	9	5.1	44	21.3	53	13.9
60 +	1	0.6	12	5.8	13	3.4
Educational level						
High School	33	18.9	7	3.4	40	10.5
Diploma	40	22.9	23	11.1	63	16.5
Bachelor	80	45.7	76	36.7	156	40.8
Master	12	6.9	54	26.1	66	17.3
Ph. D.	10	5.7	47	22.7	57	14.9
Income (SR)						
1000-5000	40	22.9	48	23.2	88	23
6000-10000	51	29.1	80	38.6	131	34.3
11000 - 15000	61	34.9	49	23.7	110	28.8
16000 - 20000	14	8	20	9.7	34	8.9
21000 +	9	5.1	10	4.8	19	5
Living area						
Ahsa	0	0	2	1	2	0.5
Dhahran	26	14.9	58	28	84	22
Khobar	18	10.3	45	21.7	63	16.5
Dammam	109	62.3	48	23.2	157	41.1
Jubail	11	6.3	53	25.6	64	16.8
Qatif	11	6.3	1	0.5	12	3.1

here. The findings about the respondents' general profile of Saudis and Non Saudis including age, gender, education, and income as displayed in Table 1 are also considered.

Table 1, shows the entire sample consists of (382) respondents of which (54.2%) 207 were Non Saudis, while (45.8%) 175 were Saudis. The findings reported how more than half of respondents were Non Saudis

including expatriates working and residing in the Kingdom of Saudi Arabia, and nearly half of respondents were Saudi nationals participated in the study. In terms of gender, (90.1%) 344 were males, and only (9.9%) 38 were females. Vast majority of respondents were males and only few of them were females. This is not surprising, as the smaller number of female participated in the survey reflects an access problem and difficulties in

Table 2. Opinions on trust in electronic banking services.

Electronic banking service	Nationality	N	Mean	Std. deviation
ATMs	Saudi	173	5.55	0.632
Missing 10	Non Saudi	199	5.31	0.726
Credit cards	Saudi	143	4.94	1.067
Missing 122	Non Saudi	117	4.57	1.085
Mobile SMS	Saudi	107	5.10	0.961
Missing 196	Non Saudi	79	4.66	1.108
Phone banking	Saudi	129	5.19	0.864
Missing 174	Non Saudi	79	4.61	1.203
Internet banking	Saudi	149	5.12	1.026
Missing 110	Non Saudi	123	4.85	1.087
Trust degree	Saudi	175	5.21	0.701
Missing 3	Non Saudi	204	4.99	0.783

reaching females to collect primary data in a conservative environment such as Saudi Arabia. Saudi law does not allow direct contact and or interaction between male and females in general, and or between foreign males and Saudi females in particular. Sohail and Shaikh (2007) highlight that, in collecting primary data from Saudi Arabia 'legally and socially, females cannot be approached by male strangers' (Sohail and Kahtani, 2005).

Furthermore, (91.1%) 348 of respondents were bank customers, and only (8.9%) 34 were bank staff. Respondents were actually asked to describe their relationship either as a bank staff or a bank customer. Vast majority of respondents were bank customers and only few of them were bank staff. The few numbers of bank staff participated in the survey reflect some of constraints in getting entry to banks and difficulties in approaching bank staff to distribute questionnaires and collect data from Saudi banks. In many occasions, the researcher and his assistants were asked to obtain a written approval from the banks headquarters in Riyadh (the Capital of Saudi Arabia) prior to distributing the questionnaire in banks' branches in the Eastern Province of the Kingdom.

The overall results showed how the respondents were well educated (40.8 %, 156) had bachelor degrees, (17.3%) 66 had master degrees, (16.5%) 63 had diplomas and about (14.9%) 57 had Ph.D. degrees and only (10.5%) 40 had high school certificates. Findings revealed how the Non Saudi expatriates participated in the survey were highly educated as (26.1%) 54 and (22.7%) 47 of them hold Master and Ph.D. degrees compared with their counterpart (6.9%) 12 and (5.7%) 10 of Saudis who hold Master and Ph.D. degrees consecutively. Initially there was uncertainty that a

questionnaire designed in English would not be understood and well answered particularly by indigenous respondents. The results reflected that the surveyed respondents were well educated and this has resulted in high response rate, generated useful data and reduced the cost of questionnaire translation from English into Arabic.

In terms of income, more than one third (34.3%) 131 of respondents had an income between 6000 and 10000 thousand Saudi Riyals (SR) per month, and more than a quarter (28.8%) 110 of respondents had income between 11000 and 15000 thousand SR per month. The results indicated how (23%) 88 of respondents had an income between 1000 and 5000 per month. Other respondents (8.9%) 34 had income between 16000 and 20000 per month. Only very few respondents (5%) 19 had an income more than 21 thousands SR per month. The income level was measured in Saudi Riyals (SR). During the study period (3.75) Saudi Riyals was equivalent to one (1) US\$ Dollar.

As with regard to location of where these respondents live, about (41.1%) 157 of respondents reported that they live in Dammam. Less than a quarter (22%) 84 of respondents indicated that they live in Dhahran. About (16.8%) 64 and (16.5%) 63 showed that they live in Jubail and Khobar respectively. Very few (3.1%) 12 and (0.5%) 2 of respondents' survey revealed that they live in Qatif and Ahsa respectively. These results showed how the survey was very well conducted and that the questionnaires were distributed to targeted respondents in the four big cities in the Eastern Province of the Kingdom of Saudi Arabia, namely Damman, Dhahran, Jubail and Khobar that had generated reliable responses.

Table 3. Degree of trust in electronic banking services.

Electronic banking service		Levene's test for equality of variance		T-test for equality of mean		
		F	Sig.	T	Df.	Sig. (2- tailed)
ATMs	Equal var. assumed	2.876	0.091	3.494	370	0.001
	Equal var. not assumed			3.528	369.998	0.000
Credit cards	Equal var. assumed	0.185	0.668	2.771	258	0.006
	Equal var. not assumed			2.767	246.189	0.006
Mobile SMS	Equal var. assumed	2.972	0.086	2.921	184	0.004
	Equal var. not assumed			2.860	153.773	0.005
Phone b.	Equal var. assumed	11.988	0.001	4.026	206	0.000
	Equal var. not assumed			3.726	127.331	0.000
Internet b.	Equal var. assumed	0.156	0.693	2.144	270	0.033
	Equal var. not assumed			2.123	254.176	0.034
Trust Degree	Equal var. assumed	0.004	0.951	2.781	377	0.006
	Equal var. not assumed			2.804	376.335	0.005

Opinions on trust and security: Saudis versus non Saudis

Opinions on trust in electronic banking services

Table 2 describes the respondents' (Saudis and Non Saudis) opinions about their trust in any of the electronic banking services including ATM, credit card, mobile SMS, Phone banking and Internet banking. The degree of trust was measured applying Likert five scale from 'Very high' to 'Very low'. 'Never used' was treated as missing data and was excluded from the analysis.

Table 2 shows the mean score of (5.55) indicated how Saudis had very high trust in the electronic banking services namely the ATMs compared with the mean score (5.31) of their counterpart the Non Saudis. The findings suggested that Saudis had very high trust in the ATM compared with their counterpart the Non Saudis.

In terms of the Credit card, the mean score of (4.94) revealed how Saudis had high trust in the Credit cards compared with the mean score (4.57) of their counterpart the Non Saudis. The mean scores revealed that Saudis had high trust in the Credit cards compared with their counterpart the Non Saudis.

As for the Mobile SMS, the mean score (5.10) of Saudis indicated that they had high trust in the Mobile SMS than the (4.66) mean score of the Non Saudis. The findings considered that Saudis had very high trust in the Mobile SMS compared with Non Saudis.

With Phone banking, the mean score of (5.19) reported how Saudis have very high trust in the Phone banking compared with the mean score (4.61) of their counterpart

the Non Saudis. The mean scores demonstrated that Saudis had very high trust in the Phone banking compared with Non Saudis.

Regarding Internet banking, the mean score (5.12) of Saudis indicated how they had high trust in the Internet banking compared with the mean score (4.85) of the Non Saudis who were using Internet banking. The findings suggested how Saudis had high trust in the Internet banking compared with Non Saudis.

Overall, the aggregate mean score of (5.21) revealed how Saudis had very high trust in using all electronic banking services namely ATMs, Credit cards, Mobile SMS, Phone banking and the Internet banking compared with the mean score (4.99) of their counterpart the Non Saudis.

Degree of trust in electronic banking services

Table 3 illustrates Saudis and Non Saudis degree of trust in electronic banking services in Saudi commercial banks including ATMs, Credit cards, Mobile SMS, Phone banking and the Internet banking. However, the null hypotheses had been presented for testing as follows:

H_0 : that there are no significant trusts differences between Saudis and Non Saudis in their use of electronic banking services in Saudi banks.

H_1 : that there are significant trust differences between Saudis and Non Saudis in their use of electronic banking services in Saudi banks

Table 4. Opinions about security of electronic banking services.

Electronic banking service	Nationality	N	Mean	Std. deviation
ATMs	Saudi	174	5.58	0.715
Missing 10	Non Saudi	198	5.23	0.765
Credit card	Saudi	143	4.83	1.183
Missing 126	Non Saudi	113	4.58	1.024
Mobile SMS	Saudi	105	5.28	0.814
Missing 201	Non Saudi	76	4.71	1.043
Phone banking	Saudi	132	5.26	0.853
Missing 172	Non Saudi	78	4.60	1.036
Internet banking	Saudi	150	5.17	0.988
Missing 107	Non Saudi	125	4.84	0.987
Security degree	Saudi	174	5.24	0.695
Missing 4	Non Saudi	204	4.96	0.766

The independent-samples t-test for statistical significance was used to test for significant trust differences in the electronic banking services between Saudis and Non Saudis in Saudi commercial banks applying $p < 0.05$ as statistical level of significance. t-Test results (p -value 0.000, less than the critical value $p < 0.05$) indicates highly significant differences.

Table 3 shows across the entire sample how there are highly significant trust differences in the electronic banking services between Saudis and Non Saudis in the commercial banking sector of Saudi Arabia in the Eastern Province. The findings suggested that, Saudis had high trust in using any of the electronic banking services comprising ATM, Credit cards, Mobile SMS, Phone and the Internet banking compared with less trust by their counterpart the Non Saudis (p -value 0.000, 0.006, 0.004, 0.000 and 0.033, respectively) in all electronic banking services indicated highly significant differences. The overall degree of trust among Saudis in using any of the electronic banking services (p -value 0.006) was significantly higher than their counterpart the Non Saudis.

Opinions on security of electronic banking services

Table 4 describes the respondents' (Saudis and Non Saudis) opinions about the security of electronic banking services including ATM, Credit card, Mobile SMS, Phone banking and Internet banking. The degree of security was measured applying Likert five scale from 'Very secure' to 'Not secure at all'. 'Never used' was treated as missing data and was excluded from the analysis.

Table 4 illustrates the mean score of (5.58) revealed how Saudis believed that the ATMs services are very secure compared with the mean score (5.23) of their counterpart the Non Saudis. The findings suggested that

Saudis had very strong belief that the ATMs services are very secure compared with their counterpart the Non Saudis.

Regarding the Credit card, the mean score of (4.83) showed how Saudis thought that the Credit cards services are secure compared with the mean score (4.58) of their counterpart the Non Saudis who had less opinion about the security of Credit cards. The mean scores revealed that Saudis believed that the Credit cards services in the banking sector are secured compared with slightly less opinion about the security of their counterpart the Non Saudis.

With Mobile SMS, the mean score (5.28) of Saudis indicated that they considered that the Mobile SMS services are very secure compared with (4.71) mean score of the Non Saudis. The findings suggested that Saudis had strong belief that the Mobile SMS services are more secure than the opinions of the Non Saudis.

As for the Phone banking, the mean score of (5.26) reported how Saudis had very strong belief that the Phone banking services are very secure compared with the mean score (4.60) of their counterpart the Non Saudis. The mean scores indicated that Saudis believed how the Phone banking services are very secure compared with Non Saudis opinions.

In terms of the Internet banking, the mean score (5.17) of Saudis revealed how they considered that the Internet banking services are very secure compared with the mean score (4.84) of the Non Saudis who had less belief about the security of the Internet banking. The findings showed how Saudis had strong belief about the security of the Internet banking services compared with opinions of the Non Saudis.

Overall, the aggregate mean score of (5.24) revealed how Saudis have strong belief that the electronic banking services comprising ATMs, Credit cards, Mobile SMS,

Table 5. Security degree of electronic banking services.

Electronic banking service		Levene's test for equality of variance		t-test for equality of mean		
		F	Sig.	T	Df.	Sig. (2- tailed)
ATMs	Equal var. assumed	1.727	0.190	4.515	370	0.000
	Equal var. not assumed			4.535	368.605	0.000
Credit cards	Equal var. assumed	1.998	0.159	1.717	254	0.087
	Equal var. not assumed			1.746	251.848	0.082
Mobile SMS	Equal var. assumed	3.374	0.068	4.095	179	0.000
	Equal var. not assumed			3.937	136.597	0.000
Phone b.	Equal var. assumed	3.285	0.071	4.959	208	0.000
	Equal var. not assumed			4.718	137.961	0.000
Internet b.	Equal var. assumed	0.013	0.910	2.787	273	0.006
	Equal var. not assumed			2.787	264.238	0.006
Security degree	Equal var. assumed	0.119	0.730	3.666	376	0.000
	Equal var. not assumed			3.694	374.569	0.000

Phone banking and the Internet banking services are very secure compared with the mean score (4.96) of their counterpart the Non Saudis.

Security degree of electronic banking services

Table 5 describes the respondents' (Saudis and Non Saudis) opinions about the security of electronic banking services including ATM, Credit card, Mobile SMS, Phone banking and Internet banking. The null hypotheses had been presented for testing as follows:

H_0 : There is no significant security difference between Saudis and Non Saudis in their use of electronic banking services in Saudi banks.

H_1 : There are significant security differences between Saudis and Non Saudis in their use of electronic banking services in Saudi banks.

The independent-samples t-test for statistical significance was used to test for significant security differences of electronic banking services between Saudis and Non Saudis in Saudi commercial banks applying $p < 0.05$ as statistical level of significance. t-Test results (p-value 0.000, less than the critical value $p < 0.05$) indicates significant differences.

Table 5 shows across the entire sample how there are highly significant security differences in the electronic banking services between Saudis and Non Saudis in the commercial banking industry of the Kingdom. The findings suggested that, Saudis had strong belief that the electronic banking services are very secure compared with less belief about the security by their counterpart the

Non Saudis (p-value 0.000, 0.000, 0.000, 0.006, respectively) in ATM, Mobile SMS, Phone and the Internet banking services indicated highly significant differences. Nevertheless, the findings (p-value 0.087) suggest that there are no significant differences between Saudis and Non Saudis in their judgement about the security of Credit cards services. However, the overall degree of security among Saudis in using any of the electronic banking services (p-value 0.000) is significantly higher than their counterpart the Non Saudis.

Moreover, a number of customers particularly the Non Saudis complained about the security of Credit cards. Respondents believed that Credit cards are not secure as the security code at the back of the cards can simply be read and copied by others as a bank customer commented:

'Any credit card should have a security number, but credit cards are not secure at all due to the fact that the three digit No. (Security code) can easily be read and used by others.'

Another security issue is related to the lack of use of Personal Identification Number (PIN) in shopping centres. In the Eastern Province of Saudi Arabia a customer can use his credit card to purchase from shopping centres without entering his PIN for verification. As a customer stated:

'Another problem is that we use our cards to buy form shops without using our PIN and this is a big problem because anyone can use your card, so I think PIN should be used along with credit cards in shopping centres.'

However, the Association for Payment Clearing Services

and card issuers, required customers to use the Chip and Pin by entering their personal identification number (PIN) on a special keypad located close to the Electronic Funds Transfer at Point of Sale Service (EPOS). The introduction of Chip and Pin System affected the vast majority of face-to-face transactions and removed the burden and responsibility of shop staff to confirm the identity of a cardholder and to compare the customer signature to that on the card. The introduction of PIN at EPOS reduced the level of fraud, decreased the amount of time it takes to process a credit/debit card transaction and therefore reduced the cost associated with processing cards for traders. Customers also no longer have to store copy vouchers for transactions that have been processed with chip and pin. In Saudi Arabia including the Eastern Province, the authorized credit card holders still do transactions in many shopping centres by signing a receipt rather than inserting their PIN.

With reference to Internet banking, a number of customers also complained about the security of electronic banking services particularly with Internet banking. Respondents believed that Internet banking is not secure as they encounter a number of security threats and use of their passwords in addition to the complexity of the security system as a bank customer commented:

'There are security threats with Internet banking. I find the Internet service is difficult to use and always I have a problem of my password being frozen and the Internet security procedures are too long and very complicated.'

Moreover, a number of security issues need to be considered when shopping online through the Internet such as identity theft, security breaches by Hackers, as a bank customer reported:

'I was stunned when I later discovered someone bought an airline ticket by Internet using my Credit card. This is unbelievable, I lost my money, and my bank was unable to help me or do anything for me.'

During the last few years, usage of the internet has expanded as a new way of online shopping across a wider range of merchants and products. Nevertheless, the potential for fraud has increased too. In 2001, Visa International introduced a new online payment programme as a way of keeping the card use secure on the internet. 3D internet security system for online purchasing using a credit card has been introduced. 3D is a secure way to pay online merchants as it verifies the credit cardholder's identity when shopping online. 3D adds security to online shopping protection as a customer knows that his transaction is protected, and the risk of fraud is reduced. Verification by Visa and Master Card Secure Code enable a cardholder to create a secret credential (such as a Password) that he or she will enter when shopping online as part of the check-out process. The Password is like an "electronic signature" for internet

transactions. Once activated a card is Verified by Visa or Master Card Secure Code, and customer will be able to sign the transactions with his own secret Password just like signing the sales slip when shopping in person at a store. However, customers are required to enrol either through the bank's website or during their online shopping session with a participating merchant. As a result, it is important in order to ensure the confidentiality of information and that it is not being manipulated or compromised by Hackers, Saudi banks need to adopt many security measures to ensure that customers' information is protected

Conclusion

The study conducted in Saudi Arabia investigated and presented findings from survey data on the trust and the security of electronic banking services in Saudi banks in the Eastern Province of the Kingdom. The quantitative data presented very strong evidence to support the hypotheses *that there are significant trust differences between Saudi bank customers and Non Saudi bank customers in their use of electronic banking services including ATMs, Credit cards, Mobile SMS, Phone banking, and the Internet banking services in Saudi banks*. Independent t-test results (p-value 0.001, 0.006, 0.004, 0.000 and 0.033 respectively) indicate highly significant differences. The overall degree of trust among Saudis (p-value 0.005) was significantly higher than their counterpart the Non Saudi bank customers. Moreover, the quantitative data also presented very strong evidence to support the hypotheses *that there are significant security differences between Saudi bank customers and Non Saudi bank customers in their use of electronic banking services comprising ATMs, Credit cards, Mobile SMS, Phone banking, and the Internet banking services in Saudi banks*. Independent t-test results (p-value 0.000, 0.000, 0.000 and 0.006, respectively) indicate highly significant differences. The overall degree of security among Saudis bank customers in using any of the electronic banking services (p-value 0.000) was significantly greater than their counterpart the Non Saudis.

Bank respondents believed how the Credit cards are not secure and expressed their lack of trust in using Credit cards in shopping centres and the insecurity of these cards when shopping online via the Internet. The Non Saudi bank customers raised the issue of Credit cards security code. Bank respondents were sceptical about the use of their Credit cards as the three digits security code can easily be read, copied and used by others. Another security problem related to the lack of use of Personal Identification Number (PIN) in many Saudi shopping centres was also pointed out. In the Eastern Province of Saudi Arabia, bank customers use their Credit cards to purchase from big shopping centres without entering a PIN for verification, instead, the authorized Credit card holders still do transactions in

many shopping centres by signing a receipt rather than entering their PIN. Consequently, we would suggest that bank practitioners should address these security issues through the introduction and the implementation of Chip and PIN System, in order to remove the burden and responsibility of shop staff to confirm the identity of a cardholder and to compare the customer signature to that on the card. Accordingly, bank customers should no longer worry about storing copy vouchers for transactions that have been processed with Chip and PIN. Furthermore, it is very important in order to ensure the confidentiality of information and that it is not being manipulated or compromised by Internet Hackers, Saudi banks need to adopt many security measures to ensure that customer's information is protected when shopping online through the Internet.

Considering Saudi banks together with Saudi-Foreign owned banks, along with customers' preferences of one bank on another, could have provided more evidence to support differences among banks' respondents. Nonetheless, in many occasions, the researcher and his assistants were faced with difficulties and constrained in getting entry to banks and in approaching banks' respondents to distribute questionnaires and or conduct interviews prior to obtaining a written approval from the banks' headquarters based in Riyadh (the Capital of Saudi Arabia).

Finally, we would argue that the insufficiency of literature in the area of electronic banking services and the banking technology in developing countries becomes central for academics to conduct further research in this field. The bulk of the studies on banking technology services are based in mature industrial countries with a well-developed infrastructure, extensive education system, and relatively stable political economy. A further study in developing countries mainly in the Middle East that examines this area of technology is considered to be crucial; for example, the issue of gender on the usage of electronic services is an area in need of further investigation. In the context of Saudi Arabia, researchers are also urged to further examine the issues of electronic banking technology services in relation to gender. We would also suggest further research in Saudi banks, should consider customer's preference of one bank on another.

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Full Length Research Paper

Influencing factors on entrepreneurial skills of rural women in Ilam City, Iran

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Development scholars believe that one of the most important requirements for development in the 21st century is entrepreneurship, and more attention to the needs of women. For this purpose, this paper is aimed at identifying factors influencing rural women in Ilam City about entrepreneurial skills, and has been undertaken using the survey method. Questionnaire is the main instrument of data collection in this research. The population used in this research is 8, 770 Ilam rural women. Using the Cochran formula, 250 people were selected as sample using the proportional stratified sampling method. Statistical analyses are done with SPSS Version12 software. The result showed that 36% of the respondents represented low entrepreneurship skills. In addition to that, regression analysis showed that individual skills and participation and psychological features determined 37% entrepreneurial skills.

Key words: Entrepreneurship, entrepreneurial skills, rural women, Ilam City.

INTRODUCTION

In today's competitive world, and based on market economy along with rapid international changes and developments, entrepreneurship is considered as the engine of economical development that can play an important role in the country's economic growth, employment, and social welfare. Planned interventions can significantly help the economical development of countries and solve the community's unemployment problem (Ahmadpour, 2001).

Various studies have showed that one of the most important economical development objectives (whether in cities or villages) is employment, and most important mechanism and tool of it is the entrepreneurship. Entrepreneurship reduces unemployment, increases the people's productivity, resource, and the community's income. Entrepreneurship requires a particular culture which is very difficult to grow and requires a long-term effort. Ability of understanding the changes and discovering the opportunities, participation and teamwork, creativity, spirit of independence and responsibility, risk,

and jeopardizing are all the constructive elements of this culture which are not achieved by short-term and task force plans. Best strategy for developing entrepreneurial culture in rural areas is improving entrepreneurial education through various promotional and training programs (Petrin, 2002).

Considering that rural girls and women play an important role in agricultural economy but their poor access to information and knowledge has disabled them to increase their activists' productivity and use their potential capacities and opportunities (Karimi et al., 2006), research shows that women who start new businesses usually face a lack of business information and access to support systems (Allen and Truman, 1993). Also, beginner entrepreneur women have no hardware resources (savings and investment) and software resources (management and training experiences) (Carter, 2005). Therefore, a plan to develop human resources for the agricultural sector, especially for rural women and related intellectual and financial investments, should be seriously considered. Obviously, the first step in planning the human resources development is learning the human resources properties and suitable procedures for achieving this objective. In this regard, the needs of rural women should be

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evaluated and prioritized, respectively (Chizari and Shriatzadeh, 2004).

Rural women are half of the rural population. Rural women comprise 7.7% of labor in rural areas. 67% of world labor is related to women. Rural women produce more than half the foods in the world. Totally, 54% of rural women work in agricultural, 34.5% in industrial and 9% in service sector (Lahsaeizadeh, 1995).

Hisrich (2005) believed that women are the world's largest underprivileged group. Accordingly, planners and experts, in the first step, should concentrate their efforts to eradicate the limitations and privation, and lead the rural women to the social and economical equality. He believes that it is not possible except by empowering them through entrepreneurship.

Entrepreneurship is the act of being an entrepreneur which means accepting responsibility, pursuing opportunities, providing the needs and demands through innovation and starting a commercial business (Burch, 1986).

In this study, entrepreneurship is operating a business by the rural women of Ilam city and accepting the risk with the aim of employing themselves and others. Entrepreneurs require different skills to operate and manage a successful business. The ability of a gained knowledge correct application and using it in business administration represents an entrepreneur's level of professional skills. These skills are different in a variety of businesses and it is assured that every business require skills and specialized knowledge such as personal skills, entrepreneurship's managerial skills, and entrepreneurship's technical skills, (Ahmadpour, 2001). Training requirements are needs removable through training. These requirements are only discussed in the field of knowledge, skills, and attitudes. Inevitably, training requirements are desirable changes in knowledge, skills, and behavior which an organization's members should initiate so that the job related duties and responsibilities, acceptable and consistent with standards, would be done desirably (Torkzadeh and Abbaszadegan, 2000). So, in this study, the training requirement is the gap between competence of rural women at the present level and a higher level of competence in the field of entrepreneurial skills which is essential for the rural women's effectual performance in starting a business. Rural women, in this study, are women who can read or write and reside in rural areas of Ilam city and most of their activities are agriculture, animal husbandry, handicrafts, and services.

Winn (1998) believes that entrepreneurship training brings up entrepreneurs by increasing knowledge about the labor market, increasing the psychological characteristics such as self-confidence, self esteem, and self efficacy. Jones and English (2004) in their studies found that there is a significant relationship between entrepreneurial training, self-confidence, and the skills of individuals in recognizing the business opportunities. Hisrich and Brush (1998) in research about entrepreneur

women have come to the conclusion that variables such as previous experience, education, participation in business, management skills, age, marital status, and economical status in life have a considerable effect on the success of the entrepreneur women.

Howard (2004), in a study, examined the effect of creativity, risk, internal control, achievement motivation, and independence on entrepreneurship and concluded that there is a direct link between this abilities and entrepreneurial ability. Boroumandnasab (2002) evaluated the relationship between development motivation, risk, creativity, and self esteem and showed that there is a significant relationship between development motivation, creativity and entrepreneurship. Golrad (2004), in a study entitled "factors affecting the development of Iranian women entrepreneurship", concluded that there is a significant relationship between individual factors, personality characteristics, cultural factors, human capital, and entrepreneurial development.

Bahrami and Zamani (2006) evaluated the effects of self-confidence, perseverance, futurism, creativity, commitment, and social relationships on the entrepreneurial skills and concluded that there is a positive significant relationship between self-confidence, perseverance, social relationships, and job skills. Jelodar et al. (2007) in a study entitled "factors affecting the success of north country's women entrepreneurship" showed that the TV, visiting the other's business, and entering the training promotional classes, are most common communication channels to gain occupational information. Family has had the most effect on their work success. Help to improve the living conditions of families and an independent income have been the respondents' most important stimulus for starting business and achieving success. Women who confirmed the fathers' influence on their success have enjoyed higher average success than other women. Correlation of entrepreneur women's success rate with the motivation to earn more money and help to improve the living conditions of families is positive and significant, while jobbery and self determination is negative and significant, and the use of radio, television, and the internet is positive and significant.

There are two main reasons for studying the entrepreneur women. The first reason is that entrepreneur women are considered as an important sealed source of economical growth during the past decade, employing themselves and others and making the community ready to take advantage of the entrepreneurial opportunities.

The second reason is that the issue of women in the entrepreneurship has been neglected by both the community and the social sciences (Sichani et al., 2007).

The main purpose of this study is to identify factors influencing Ilam city's rural women in gaining entrepreneurial skills. The objectives are the effects of rural women's personality characteristics, individual skills, participatory characteristics, and psychological

Table 1. The relationship between research variables and entrepreneurial skills.

Variable	Correlation coefficient	r	p
Age	Pearson	-0.15 *	0.018
Marital status	Lambda	0.26	0.001
Educational conditions	Spearman	0.403**	0.00
Family income	Pearson	0.123*	0.053
Personal skills	Pearson	0.541**	0.00
Participation features	Pearson	0.483**	0.00
Psychological characteristics	Pearson	- 0.186**	0.00

Table 2. Stepwise regression of rural women's entrepreneurial skills.

Variable	R	R ²	Adjusted R ²
Personal skills	0.541	0.293	0.290
Participation features	0.591	0.349	0.344
Psychological characteristics	0.610	0.372	0.364

characteristics on the entrepreneurial skills.

MATERIALS AND METHODS

This is an applied and non-experimental (descriptive) research. The methodology of this research is survey. Statistical population is 8,770 of Ilam city's rural women, of which, according to Cronbach formula, 250 were selected by proportional stratified sampling. Questionnaire was designed as the main tool of the study; all questions except the personal characteristics of rural women were written as Likert's five-point range including five sections: knowing entrepreneurial skills, personality characteristics, individual skills, participation features, and psychological characteristics of rural women. Dependent variable of study is entrepreneurial skills of rural women. For measuring the study tools, validity of the questionnaire was given to six Islamic Azad University professors and experts associated with the subject in the ministry of Agricultural organization, and a primary-test that involved completing 30 questionnaires for measuring reliability was done and the Cronbach alpha coefficient was 84%.

Dependent variable of this study is the rural women's entrepreneurial skills. In this study, descriptive and inferential statistics were calculated and reviewed. The data were analyzed through SPSS version 11/5 software.

RESULTS

Research findings show that 68.8% of respondents were 21 to 40 years old and 4% were above 51 and more. The minimum age was 15 years and maximum was 60 years. Rural women's level of education shows that 34% of the respondents have diploma and 16% of them have bachelor or higher degrees. The results of studying the respondents' marital status indicate that 2% were divorced and 50.8% were married.

Based on data collected, the majority of respondents

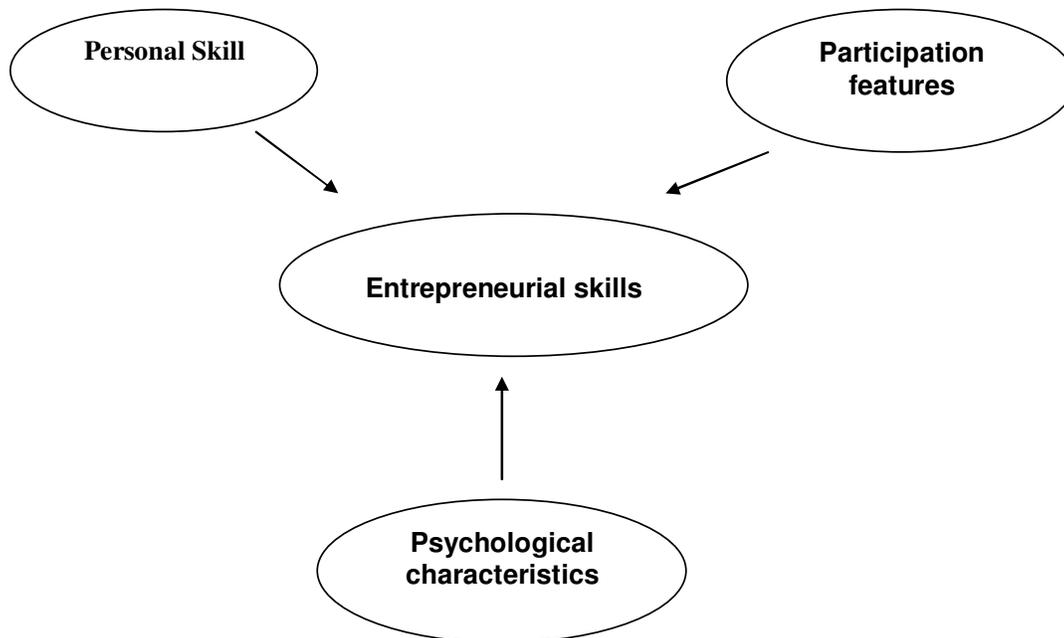
(27.2%) have expressed their individual skills and their effects on the entrepreneurial skills at a low level. According to data collected, the majority of respondents (31%) have expressed their participation characteristics and their effects on the entrepreneurial skills at a medium level. Most respondents (39%) have expressed their psychological characteristics and their effect on entrepreneurial skills at a high level. According to this, 36% of respondents expressed their entrepreneurial skills were at a low level, and only 7% expressed it at very high level.

For analysis data, Pearson, Spearman and Lambda's correlation coefficients were used to test the correlation between variables. Findings of Table 1 shows that there is a significant negative relationship at 5% level between the age and entrepreneurial skills, while there is a significant positive correlation at 1% level between the educational conditions, personal skills, and participation features and the entrepreneurial skills. Also, there is a significant negative correlation at 1% level between respondents' psychological characteristics and their entrepreneurial skills.

To predict influencing variables on entrepreneurial skills of rural women, multiple regression was used. After entering all independent variables having significant correlation, individual skills, participation features, and psychological characteristics variables remained in the equation. These variables determined 37% percent of the dependent variable variance (Table 2). Individual skills variable with the amount of $R^2 = 0.290$ is the most important variable influencing the entrepreneurial skills of Ilam's rural women; this variable, alone, determined about 29% of the rural women's entrepreneurial skills. According to the results shown in Table 3, the regression equation according to the B and β quantities were

Table 3. Standardized and unstandardized coefficients of rural women's entrepreneurial skills.

Variable	Unstandardized coefficient B	Standardized coefficient β	t-value	Sig.
Constant	29.015	-	11.682	0.000
Personal skills (X_1)	0.901	0.541	10.134	0.000
Participation features (X_2)	1.061	0.277	4.623	0.002
Psychological characteristics (X_3)	-1.131	-0.151	-2.674	0.003

**Figure 1.** Influencing factors on entrepreneurial skills of rural women.

respectively given as:

$$Y = 29.015 + 0.901X_1 + 1.016X_2 - 0.131X_3$$

$$Y = 0.541X_1 + 0.277X_2 - 0.151X_3$$

Figure 1 shows collections of determining and effective factors in improving rural women's entrepreneurial skills.

DISCUSSION

This study showed that majority of respondents expressed that their entrepreneurial skills are at a low level. The results of the correlation coefficient indicate that there is a positive relationship, significant at 5% level between age and entrepreneurial skills of rural women. There is a significant positive correlation at 1% level between education level, individual skills, and collaborative features variables of respondents and their entrepreneurial skills. Similarly, there is a significant

negative correlation at 1% level between the respondents' psychological characteristics and entrepreneurial skills. The results of this study are in accordance with the study results of Hisrich and Brush (1998), Howard (2004), Zamani and Bahrami (2006), Jelodarzadeh et al. (2007), and Golrad (2005).

In this regard, it is suggested that educational preparations adopted in training packages for entrepreneurial skills training to enhance rural women's information about these cases and the entrepreneurial skills training centers should be developed too. For training the rural women, the required infrastructures should be strengthened to equip the entrepreneurial training centers. Therefore, participation and interaction between rural women should be expanded by developing the entrepreneurial training in rural areas and government should investment in entrepreneurial training projects.

Results of stepwise regression analysis show that the individual skills, participation features, and psychological features, determined 37% of the dependent variables

variance. The results show that individual skills is the most important variable affecting entrepreneurial skills among Ilam's rural women so that this variable, alone, determined about 29% of entrepreneurial skills. Thus, it is clear that the individual skills, collaborative features, and psychological features determined 37% of entrepreneurial skills. Howard (2004), Winn (1998), Jones and English (2004), Boromandnasab (2002), Golrad (2003), Zamani and Bahrami (2006), and Jelodarzadeh et al. (2007) have confirmed this in similar studies.

In this regard, it is suggested that a serious and fundamental revision in preparing the content of entrepreneurial training programs should be done to provide accurate, appropriate, comprehensive, and up to date information, and improve their quality according to the individual skills of rural women. In other words, paying attention to the addressees' requirements should be the main objective of entrepreneurial training program.

There are various policy implications for improving women entrepreneurship. The suggestions here are structured into five parts: (i) empathetic actions of government, (ii) attitudes recommendations, (iii) bank-related policy recommendations, iv) training and consultancy related policy implications, and (v) other significant recommendations.

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Full Length Research Paper

Employee motivation: A study on some selected McDonalds in the UK

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The main focus of this research is to find out the different perspectives of employees and management in respect of motivation at McDonalds through different motivational theories. The study reveals that the managers of McDonalds possess mentality, which complies more with the Taylor's scientific theory in which, according to them, the crew members are likely to work harder when they are being pressured and supervised closely for the maximum expected output. Employees' views are different from the managers, in that they often possess an instrumental mentality. Most of the employees do not take working in McDonalds as their future career. It is found that the motivation of the McDonalds employees is low due to poor employer-employee relationship, low wage rate and less reward. Suggestions have been given at the end to motivate the employees.

Key words: Motivation, McDonalds, instrumentality, Taylorism.

INTRODUCTION

One of the greatest challenges for any organization is to improve its level of efficiency and productivity. Moreover, an increase in productivity and efficiency can be achieved not only by applying techniques and adapting advanced technologies, but also needs motivated and enthusiastic employees. To gain a productive and positive behaviour through its employees, management needs to create a sound motivational environment within the entire organization. A positive motivation through the workforce is likely to lead a company to grow more smoothly in terms of production, productivity and effectiveness.

Motivation is an important and unavoidable factor in an organization, and motivation lies on several elements rather than simply payments or wages. It is argued that if an individual's needs are not satisfied, then the employees will not be motivated to work. A lack of motivation may lead to reduced effort and lack of commitment. In fast food restaurants, like McDonalds, customer satisfaction is an obligatory factor and as it has already been mentioned, motivation plays an important role, as an excellent customer service can only be achieved when the employees are motivated and satisfied in their job.

Employees are the key to any organization. These employees ensure the interaction of financial, industrial

and other resources so that the organization can function. In establishing a developed and excellent quality service, motivation plays a major role. The major problems are the tensions related with motivation of employees. The employer needs to recognize the level of motivation of each and every employee. Generally, the employee use different motivational techniques to motivate their employees. It is well accepted that the fast food industry is a highly competitive sector which often remains relatively labour intensive. Motivating the employees successfully may be one of the major factors that lead McDonalds to a competitive advantage. Thus, there is a need to conduct a research on McDonald's employees about their motivation.

Objectives of the study

The main objective of this study is to determine the management view and to find out the employees views through motivational theories.

McDonalds in the UK

In the UK, McDonalds opened its first restaurant, in Woolwich, in 1974. Initially, all the restaurants were owned and managed by the Company. However, they

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started recruiting franchisees in the mid-1980 and opened their first franchisees restaurant in 1986. Since that time, the number of UK franchisees has steadily grown. Today, more than 2.5 million people in this country place their trust in McDonald's everyday, trusting the company to provide them with food of a high standard, quick service and value of money (Wikipedia, 2007).

What is Taylorism?

F. W. Taylor, the originator of scientific theory, formalized the principles of scientific theory in the 20th century and designed a set of ideas aimed at getting maximum output from the employees in the manufacturing industries. Taylor (1911) argued that employee productivity was largely unproductive because of a labor force that functioned by 'rules of thumb', and improved productivity with a cutting down of the work force. According to scientific theory, factories are managed through scientific methods rather than using of the 'rule of thumb'. He thought that there was one and only one method of work that maximized the competence or efficiency. Taylor imagined that the task allocation is to turn a particular task into groups and distribute those groups of work to different employees to achieve more output and favorable result. In terms of motivation, he emphasised on monetary incentives to motivate the employees (Sandrone, 1997). Taylorism implies low-trust relations between employer and employees. This is why direct control is needed to ensure that the labour power bought is turned into the labour performed (Pruijt, 2000).

Description of McJob

It is universally true that fast food jobs are suck, greasy, ill paid, temporary, untrained and without benefits and among teenagers. According to Merriam-Webster's Collegiate Dictionary (2003), most of the fast food employees are employed in 'McJobs'. The term McJob is used in an impertinent manner to explain the type of job, which is usually related with the retail or service industry that is, a low paid position for which skills are not generally required and the employee turnover rate is high. McJobs are related with low-trust and cost cutting work contexts (Bacon and Blyton, 2000).

Concept of McDonaldisation

McDonaldisation is the term used by George (1993) to describe a sociological phenomenon in his famous book 'McDonaldisation of society'. One of the primary aspects of McDonaldisation is that, almost any task should be rationalized. McDonaldisation takes a task and breaks it down into further smaller tasks. This is repeated until all tasks have been broken down to the minimum possible

level. As a result, tasks are then rationalized to find the single most efficient method for carrying out each task.

Instrumental view

Many young people have been engaged into work by the worldwide expansion of fast food outlets which are often their first job and many are students having to finance their way through educational institutions (Felstead et al., 1999). In McDonald's, most of the employees are students, whereas 70% of them are under 20 years of age (Royle, 2000) and most of the McDonalds restaurants in UK could not function without them as they are being based on students in an enormous way. Moreover, a particular amount of people also believe McDonalds is the 'job for students'. According to Lucas and Ralston (1996), 'students are considered to be more flexible than other sectors of the part-time and casual labour market'. The students are not interested in full-time work or in acquiring long term or secure employment because of the constraints of classes (Mizen et al., 1999). Students are keen and able to work the unsuitable hours required by retail and catering services that open for long hours (Curtis and Lucas, 2000).

Many of the students consider McDonalds as a preferably suitable job, when compared to the other fast food restaurants because of several factors. One of the most important reasons why students prefer working with McDonalds is because of the amount of flexibility they offer. Students are able to choose hours that they are available for work in advance and their shifts are scheduled within this availability, giving them the ultimate flexibility which helps them to adjust their college or university schedules and avoid conflicts.

Working in McDonalds helps students to be financially capable of supporting themselves for studies and other needs, such as accommodation, socializing with friends, etc. According to Lucas and Lammont (1998), students working in McDonalds encompassed more things than just simply earning money, and this may be a combination of the social factors, such as making new friends, working with the same age group of people, mixing with customers and learning new skills, which are likely to help them become more confident in their future career. However, apart from the social intention, they are also attracted to the other facilities given by McDonalds, such as free meal at work and providing discount card for discounts while purchasing from McDonalds in any region of the country. Furthermore, some of the stores also tend to provide other facilities, apart from food, such as free cinema ticket and trips.

However, by analyzing the aforementioned factors, it seems to demonstrate that, students possess an instrumental mentality at work, due to the fact that they are only concerned about their self interest. Many of the students are only working to earn money and support

themselves for basic necessities, and there are very few of them who tend to seek a career in McDonalds. The employees are very less likely to aim to contribute their skills and academic knowledge to McDonalds in the future or for a long term. This is due to the fact that they take the job with the intention to work there for a short term period or on a temporary basis.

The reason behind the possession of an instrumental mentality may be because these students are ambitious and prefer working in a different environment unlike the ones of McDonalds. Generally speaking, working in McDonalds is highly based on floor and its all about providing quick, smooth and convenient service. They tend to be trained to maintain policies rather than making policies, and everyone has the same type of target such as increasing sales, maintaining hygiene, etc., but many of the students may have a different perspective and may want to do something which is more towards making policies, research and contributing their knowledge to the society or economy.

Many of the students may even not be willing to work in McDonalds, may be because there is no such particular level of academic qualification required, and any one even if he/she is unqualified is being able to be promoted to the upper position of management. Therefore, many students may not think that it is a good idea to compete with someone who is not up to the scratch compared to the academic background, and it does not even reflect any sort of prestige also in the society working in McDonalds.

Despite the aforementioned facts, there are certain types of people sticking to McDonalds and planning to build their future career on it. There may be several reasons for those people choosing McDonalds and they may be as follows:

- (i) They may have limited capabilities or boundaries, such as their level of qualification may not allow them to have an unlimited career or exceed a certain level of position.
- (ii) They might be well fitted with the job and think of sticking to it rather than looking for a better prospect and may not even be ambitious.
- (iii) The nature of the job itself, type of responsibility, recognition of the effort and the particular individuals' achievement are likely to persuade them to build their career on McDonalds.

THEORIES OF MOTIVATION

Considering what motivated employees and how the employees were motivated was the focus of many researchers, following the publication of the Hawthorne study results. A considerable number of researches have been carried out and a number of theories on what motivates people have been propounded. Here, some theories are described as follows:

Economic theories

These theories are based upon the notions of Taylorism and scientific management. People operate in their own economic self interest. Basically, payments are directly linked to measure increments of work, as in payment by outcomes or results.

There are some beliefs that Taylor and his followers espoused (Smith, 2005):

1. Generally, people disliked work and had to be forced into doing it.
2. Employees were untrustworthy and unreliable and hence had to be supervised and directed.
3. For maximum output or productivity, jobs must be standardized and divided into tasks and sub tasks. Each of these was allocated to a different employee.
4. A system of hierarchical authority was mandatory to execute management's policy.
5. The 'one best way' exposed and taught to employees. Each and every task had to be cautiously selected.
6. Select the right person and tools.
7. Ensure that employees use the 'one best way' by applying a payment by result /outcomes system, that is, the more you produce, the more you earn.

Taylor's scientific theory is being implemented enormously by McDonalds recruiting managers to carry on activities known as task management. Managers always give instructions to the employees at work and impose task management (mainly cleaning), thereby reducing sluggishness and individual thinking. Preset registers, grills and other different equipments facilitate to reduce the need for individual thinking more to the point where all employees' actions are just like an instrument.

Maslow's need hierarchy theory

Maslow propounded that man has a hierarchy of five needs, which begins with the basic need of psychological well-being and goes up to realisation of one's potential. These needs are physiological, security, social, esteem and self actualisation needs.

Maslow separated these five needs into higher and lower levels. Physiological and safety needs were described as lower order needs, while social, esteem and self-actualisation needs were described as higher order needs. The differentiation between the two orders is that, while lower order needs are satisfied externally by things such as wages, the higher order needs are satisfied internally to the person.

Herzberg two factor theory

Herzberg observed that the productivity of an employee was dependent not only on the job satisfaction, but also

on work-motivation. Based on the study of job attitudes of 200 engineers and accountants, in which Herzberg (1959) investigated the question 'What do people want from their job?' He concluded that job satisfaction came from two sets of factors, hygiene factors and true motivators.

Hygiene factors

These are extrinsic factors which are present in the environment (job context). They remove discomfort or dissatisfaction and thus support mental health, but in themselves, they are not motivators. Their presence does not guarantee motivation, but absence may cause dissatisfaction, and hence motivation. For instance, pay, allowances, job security, promotion, quality of supervision, interpersonal relationship, physical working conditions, etc, are hygiene factors that result to job dissatisfaction.

True motivators

These are factors which are connected with job and to the reward that results directly from properly doing a work. They motivate employees to superior performance, and accept challenging tasks, growth and development. Some of the examples of true motivators are achievement, recognition for work, etc. The belief in Herzberg's theory is that improved job satisfaction is a vital source of motivation and will lead to better performance because of its association with improved productivity.

Equity theory

Equity theory proposes that employees compare their own output/input ratio (the ratio of the output they receive from their work place and to the inputs they contribute) to the output/input ratio of another person. Unequal ratios create job dissatisfaction and motivate the employees to restore equity. When ratios are equal, employees experience job satisfaction and are motivated to maintain their current ratio of outcomes and inputs or raise their inputs if they want their outcomes to get higher. Outcomes consist of pay, fringe benefits, status, opportunities for advancement, job security, job verity, flexible working arrangement and anything else that employees desire and receive from an organization. Inputs comprise special skills, training, education, and work experience, effort on the job, time, interpersonal skills and anything else that employees perceive that they contribute to an organization.

Expectancy theory

Expectancy theory characterizes individuals as rational beings. People think about what they must do to be remunerated and how much remuneration means to them

before they actually perform their jobs. As per this theory, individuals have different sets of goals and can be motivated if they have certain expectations. This theory implies that management needs to show to employees that their effort will be recognised and rewarded in both financial and non financial terms. Victor's expectancy theory is based on different beliefs. These are:

Force

The motivational force with which the person will pursue a particular course of action. The attractiveness or unattractiveness, to the person, is the outcome of that course of action. This is frequently given a grade between +1 and -1.

Valence

Valence leads to the emotional orientations people hold with respect to rewards (outcomes). When the reward is truly received, it may or may not be as satisfying as expected. It is allied with some object or state called an outcome or reward. This sort of reward can be either tangibles or intangibles or both. Tangible rewards belong to money and intangible rewards include recognition or feeling of accomplishment, or they may be levels of performance.

Instrumentality

The outcomes or reward describes earlier, are considered to have some degree of association with the individual's performance. In fact instrumentalities signify this association. If an individual believes this, works hard and performs at a high level, his motivation may pause if that performance is not properly rewarded, that is, if the performance is not perceived as instrumental to bringing about the outcomes (rewards). The expectancy theory formula can be realized as:

Motivation = Valence × Expectancy (Instrumentality).

MATERIALS AND METHODS

This study is mainly based on primary data. The secondary data are used for gathering knowledge about McDonalds, Taylorism, Macjob, Macdonalisation, instrumentality and different motivational theories. Three branches of McDonald's restaurant, that is, George Street, Lea grave and Dunstable, located at Town centre, in Bedfordshire have been selected purposively as a sample. As it was not possible to reach all the employees and the McDonald's restaurant in Bedfordshire, the non proportional quota sampling method was used in conducting the survey. In fact, this method allows the researcher to specify the minimum number of sample units. This method is not concerned with having numbers that match the proportions in the population. As the McDonalds are operated on the basis of the same rules and regulations, all over the UK, so the sample has been considered as representative.

Data were collected through survey questionnaire. The schedule was prepared on the basis of five hypotheses, and 100 employees

Table 1. Analysis regarding employees.

Aspects	Strongly agree		Agree		Not sure		Disagree		Strongly disagree	
	No.	%	No.	%	No.	%	No.	%	No.	%
Flexible hours	33	55.00	14	23.33	02	3.33	11	18.33	00	00
Facilities like food	31	51.67	17	28.33	08	13.33	04	6.67	00	00
Wage rate	00	00	00	00	00	00	51	85.00	09	15.00
Employer-employee relationship	00	00	00	00	07	11.67	40	66.67	13	21.67
Reward	00	00	08	13.33	05	8.33	32	53.33	15	25.00
Making new friends	12	20.00	37	61.66	07	11.67	04	6.67	00	00
Choosing career	00	00	02	3.33	06	10.00	09	15.00	43	71.67

and 60 managers were interviewed to collect data. The null hypotheses are thus presented:

H₁: Employer-employee relationship does not play any role on motivation.

H₂: Existing wage rate has no effect on motivation.

H₃: Reward does not play any role on motivation.

H₄: Working conditions have no effect on motivation.

H₅: Flexible scheduling does not play any role on motivation.

Here, the dependent variable is motivation and the independent variables are employer-employee relationship, wage rate, rewards, working conditions and flexible scheduling. Likert's five point scale was used in the questionnaire. For employer-employee relationship, the employees were asked whether or not they were treated as a human being, and whether or not they got enough break during working hour. For the existing wage rate, they were asked what they think about their wage that they are paid in hourly basis. For rewards, employees were asked about their promotion and recognition. For working condition, they were asked about job security and job environment. For flexibility scheduling, they were asked about their scheduling of work in each working day. The collected data were processed and analysed in logical order. In analysing data, SPSS was used for T-test in order to accept or reject the null hypothesis, while 5% level of significance was used to signify the results.

RESULTS

The study shows that for employees, out of 100 respondents, 60% are male and 40% are female. So, the study reveals that majority of the employees of the McDonalds are male. Age limit of the employees is within 16 to 40 years. There is no person whose age is above 40 years. It is found that most of the employees are less than 20 years (70%). It also reveals that, 74% of the employees are part time jobholders and the rest are full time jobholders (Appendices 1 to 3). In the case of the employers, 80% are male and 20% are female. Most of the employers' age is between 31 and 35. Only 10% are above 35 years of age. It is also revealed that 40% of the employers are part time job holders and 60% are full time job holders (Appendices 4 to 6).

The employees' view of McDonalds (instrumentality)

Many of the students consider McDonalds as a preferably

suitable job, as compared to the other fast food restaurants. One of the most important reasons why students prefer working in McDonalds is because of the amount of flexibility they offer. Students are able to choose hours that they would be available for work in advance and their shifts are scheduled within this availability, giving them the ultimate flexibility, which helps them to adjust their college or university schedules and avoid conflicts. Working in McDonalds helps students to be financially capable and support themselves for studies and other needs, such as accommodation, socializing with friends, etc.

Students working in McDonalds encompassed more things than just simply earning money, and this is the combination of the social factors, such as making new friends, working with the same age group of people, mixing with customers and learning new skills, which are likely to help them to become more confident in their future career. Apart from the social intention, they are also attracted to other facilities given by McDonalds such as free meal at work, and providing discount card for discounts while purchasing from McDonalds of any region.

Flexible hours

Table 1 revealed that 55% of the employees were strongly in agreement with this and 23.33% agreed with this. Only 3.33% were not sure about this, but 18.33% disagreed with this statement.

Facilities like food

Out of the 60 employees, more than 30 were encouraged to work in McDonalds as a result of the free food facility provided by McDonalds. Some 28.33% of them were just about agreeing with this and 6.67% do not actually think that they worked in McDonalds for free food. However, 8 among them were not sure about this.

Wage rate

When the employees were asked about the wage rates at

Table 2. Analysis regarding managers.

Aspects	Strongly agree		Agree		Not sure		Disagree		Strongly disagree	
	No	%	No	%	No	%	No	%	No	%
Working under pressure	11	73.33	03	20.00	01	06.67	00	00	00	00
Employees are unreliable	09	60.00	04	26.67	02	13.33	00	00	00	00
Employees need supervision	10	66.67	03	20.00	02	13.33	00	00	00	00
Jobs divided into tasks	13	86.67	02	13.32	00	00	00	00	00	00
Chain of command	14	93.33	01	6.67	00	00	00	00	00	00
Right person and right tool	15	00	00	00	00	00	00	00	00	00
Operating one best way	10	66.67	03	20.00	02	13.33	00	00	00	00
More production more earning	10	66.67	03	20.00	02	13.33	00	00	00	00

McDonalds, 85% of the employees stated that the wage rate was not fair and 15% totally disagreed that the wage rates at McDonalds was fair.

Employer-employee relationship

Employees were asked about their relationship with their employer. Majority of the employees (66.67%) replied that the relationship between them were not good. Moreover, 11.67% of the employees were not sure if their relationship was good or bad.

Reward

Not even a single employee surveyed, strongly agreed with the statement that McDonalds rewarded its employee for their hard work. As per Table 1, it was seen that only 13.33% almost agreed with the reward system provided by McDonalds. Majority of the McDonalds employees disagreed with the reward system and their percentage was 53.33. However, 15 out of 60 employees strongly disagreed with this.

Making new friends

The result, in Table 1, has also been presented in the form of bar chart, in that more than half (61.66%) of the staff at McDonalds think that they made new friends and met new people at McDonalds. However, 20% of the employees strongly believed this, while only 6.67% think that they do not make new friends in McDonalds.

Choosing a career

Majority of the people surveyed, think that they would not choose a career in McDonalds, but Table 1 shows that their percentage is 71.67%. Moreover, 2 people hardly thought that they would choose a career in McDonalds.

However, by analyzing the aforementioned factors, it can be seemingly demonstrated that students possess an instrumental mentality at work, in that they are only concerned about their self interest. Many of the students are only working to earn money and support themselves for basic necessities, and there are very few of them who tend to seek a career in McDonalds.

Managers' view of McDonalds

Working under pressure

From Table 2, it is seen that majority of the managers strongly believe that crew members work hard under pressure, their percentage being 73.33, whereas only 20% were in agreement with this. Only one out of the 15 managers was not sure whether crew members worked hard under pressure or not.

Unreliableness of employees

More than half of the managers believed that employees were unreliable and their percentage is 60. Among the managers, four just agreed with this, whereas only 13.13% were not sure whether employees needed to be supervised all the time or not.

The need for employees to be supervised

When asked whether or not crew members should be constantly supervised and directed by managers for maximum output, only 2 of the managers were not sure about this. On the other hand, 66.67% strongly believed this fact.

Division of jobs into tasks

When asked whether or not jobs should be broken down into several tasks and operated by different crew

Table 3. T-test for testing the hypotheses.

Variable	Unstandardized coefficient		Standardized coefficient	t-value	p-value
	B	Std. error	Beta		
Constant	6.096	0.072		84.584	0.000
Employer-employee relationship	-0.191	0.056	-0.180	-3.400	0.001*
Wage rate	-0.487	0.071	-0.473	-6.844	0.000*
Reward	-0.193	0.058	-0.182	-3.318	0.001*
Employee supervision	-0.007	0.009	-0.022	-1.177	0.242
Flexibility in scheduling	-0.001	0.012	-0.002	-0.085	0.933

members, 86.67% were strongly in favour of this statement, whereas only 13.33% were just in agreement with this.

Chain of command

It is usually believed in general that the chain of command is necessary to maintain discipline and management control. Managers' view in McDonalds was not different from this. Almost all the managers showed strong belief in this and only one was not in agreement with this. Table 2 showed that 93.33% strongly agreed and 6.67% agreed with this statement.

Right person and right tool

It is a well accepted universal fact that the right person in the right job can do wonders. The managers' view in McDonalds completely matches with this fact and 100% showed their consent with this.

Operating 'one best way'

In McDonalds, there are different ways in which customers are served, but as stated by Taylor about the 'one best way', 67.67% of managers in McDonalds believe in this fact, whereas 20 and 13.33% of the managers either agreed or were not sure, respectively.

More production more earning

According to Table 2, it is shown that more than half of the managers strongly believed that higher production leads to more income. On the other hand, almost equal numbers of managers were either not quite sure or they just agreed with this.

Five hypotheses have been tested through the t-test for finding causes behind the turnover of McDonalds. The results are thus presented:

From these tests, the researchers found that null hypotheses 1, 2 and 3 are rejected and null hypotheses 4 and 5 are accepted. These tests are based on the 5% level of

significance. The interpretations of the tests are thus given:

H₁: Employer-employee relationship does not play any role on motivation.

The table shows that the p-value is 0.001. So, the null hypothesis is rejected on the basis of 5% level of significance and there is a significant relationship between motivation and employer-employee relationship. The value of coefficient shows that there is a negative relationship between them. It means that there is a relationship between employer-employee relationship and motivation in McDonalds.

H₂: Existing wage rate has no effect on motivation.

From Table 2, it is shown that the p-value is 0.000. So, the null hypothesis is rejected on the basis of 5% level of significance and there is a significant relationship between motivation and wage rate. The value of coefficient shows that there is a negative relationship between the two variables. It means wage rate is related with employees' motivation.

H₃: Reward does not play any role on turnover.

It is shown that the p-value is 0.001. So, on the basis of 5% level of significance, the null hypothesis is rejected and there is a significant relationship between motivation and incentive. The value of coefficient shows that there is a negative relationship between the dependent and independent variables. So it could be said that reward system has an influence in motivating employees in McDonalds.

H₄: Working conditions have no effect on motivation.

It is found that the p-value is 0.242. So, the null hypothesis is accepted on the basis of 5% level of significance and there is an insignificant relationship between motivation and working conditions. The value of coefficient shows that there is a positive relationship between them. So, there is no relationship with working condition and motivation in McDonalds.

H₅: Flexible scheduling does not play any role on motivation.

From the table, it is observed that the p-value is 0.933. So, the null hypothesis is accepted on the basis of 5% level of significance and there is an insignificant relationship between motivation and flexible scheduling. The value of coefficient shows that there is a positive relationship between them. Therefore, it could be said that, flexible scheduling does not play any role in motivating employees in McDonalds.

Considering the aforementioned discussion, it can be said that employee motivation of McDonalds in the UK is negatively associated with employer-employee relationship, wage rate and reward. There is a relationship between motivation and employer-employee relationship, wage and reward, but the working conditions and flexible scheduling have no relationship in motivating employees in McDonalds.

DISCUSSION

Based on the results gathered from the study, a discussion of theoretical and practical implementations is presented here. Table 1 shows that 73.33% managers thought that employees work hard when they are under pressure, which is consistent with Taylor's theory. In case of reliability, 9 out of 15 managers thought that the employees are unreliable which is consistent with different studies (Bacon and Blyton, 2000; Pruijt, 2000). For maximum output, employees should always need to be supervised and directed. 66.67% of the managers thought that for maximum output, crew members always need to be supervised, which fulfils one of the most important principles of Taylor's scientific theory.

Task allocation means breaking task into small and smaller tasks, which allow the determination of the most favorable result to the task. When the managers were asked about task allocation, 86.67% replied strongly in favour of this. However, this was supported by Freeman (1996) and Sandrone (1997). The chain of command is necessary to maintain discipline and management control in any organisation. In McDonald's management, the views are the same. Nonetheless, 93.33% strongly believe in this fact and it is consistent with the study (Smith, 2005).

According to Taylor (1911), to perform the job, the right person and right tool is essential. The managers' view in McDonalds absolutely matches with this fact and 100% show their consent with this. Taylor thought that for maximum efficiency, one and only one method was used. About the one best way, 67.67% of managers in McDonalds strongly believe in this fact. Higher production leads to higher income, but when this was asked, more than half of the managers strongly agree with this, while 26.67% were just in agreement with this statement. All these three variables (right person and right tool, one best way and higher production higher income) were

reflected upon this study (Smith, 2005).

McDonalds is well known for providing opportunities to its employees to work in flexible hours according to their convenience. Most of the employees are working in McDonalds as it provides flexible hours. Table 1 shows that 55% of the employees are strongly interested as it provides flexible hours and 23.33% are in favour of this. This is supported by the various studies like Curtis and Lucas (2000), Mizen et al. (1999) and Lucas and Lammont (1998).

McDonalds provides different facilities like free foods. About 51.67% of the employees strongly agreed that they work in McDonalds for free food, while 85% of the employees in McDonalds disagreed that the pay rate given by McDonalds is being fair, and the rest of the employees, which is 15%, agreed strongly that the pay rate given is far from being a decent payment and is supported by different studies (MacSaorsa, 1995; Merriam-Webster's Collegiate Dictionary, 2003).

People usually work in organisation expecting a good remuneration. Working in McDonalds is not different from this. However, 53.33% of the employees agreed that they are not being given a fair reward for their hard work and 25% of the employees agreed strongly, whereas employees believe that McDonalds do not value their hard work.

In case of making new friends in the work place, 61.66% crew members agreed that they got new friends in McDonalds and 20% strongly agreed with this and this was supported by Lucus and Lammont (1998).

Most of the employees do not take working in McDonalds as their future career. Only 2 crew members out of the 60 choose their career in McDonalds. However, 71.67% employees strongly disagreed to choose their career in McDonalds.

From the aforementioned discussion, it could be said that the managers in McDonalds think that crew members are likely to work more hard when they are being pressurised and are being supervised closely for the maximum expected output. Employees in McDonalds are also regarded as an unreliable object by their upper hierarchical position. Managers also believe that chain of command is necessary to maintain discipline and management control. Moreover, the management also tend to set up their own strategy and consider it to be the 'one best way' for carrying out jobs through McDonalds. They also believe that jobs should be divided into several tasks and operated by different crew members for better result. They prefer the right person and right tool for performing any task. At last, it could be stated that the managers of McDonalds possess mentality which complies more with the Taylor's scientific theory.

Employees' views are different from the managers, in that they often possess an instrumental mentality. Most of the employees do not take working in McDonalds as their future career, and one of the possible reasons why they work in McDonalds is because of the flexible hours

provided to the student employees as it helps them adjust their academic institution timing. Besides that, they also get various facilities such as they are being provided with free meal. Despite the facilities provided, employees are still displeased with their wages and rewards given as incentives. Thus, they regard that as being unfair.

CONCLUSION AND RECOMMENDATIONS

McDonalds is the largest catering service provider in the world in terms of system-wide sales and a pioneer in the fast food industry. It is found that the McDonalds employees are demotivated due to different reasons. For overcoming the problems, the researchers suggest some recommendations such as:

- (a) It has been found that the employees of McDonalds are not satisfied with their wages.
- (b) There is a great reason behind the demotivation of McDonalds' employees. It is suggested that for McDonalds, premium and overtime rates should be revised.

The findings revealed negative relationship of employees with their managers/supervisors in McDonalds. The respondents verified that they do not get enough breaks and appreciation for the work done. If people do not feel important, they are not motivated to stay. If they believe they are regarded as expendable, employees will leave for a position where they think they will be appreciated. The researchers suggest a cordial atmosphere should be created for the employees in McDonalds, as a whole, to overcome this problem. Management should be aware of this context.

McDonalds earn more from their business, but no financial incentive or reward is given to the employees, which creates dissatisfaction among them. The researchers think that the financial incentive should be given to the employees which would motivate them to work with more satisfaction.

Finally, by going through these facts, it could be stated that the managers in McDonalds apply Taylor's scientific theory at work. They tend to make employees work harder and supervising them closely with the intention to achieve the maximum level of output. On the other hand, employees tend to possess an instrumental mentality as they do not take the job in McDonalds as their future career. In fact, they are working in McDonalds for their survival in order to cover for their daily expenses.

Therefore, it could be concluded that both the employees and the employers are successful from their own point of views, as they have different targets and ambition while working in McDonalds.

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APPENDIX

Table 1. Gender status.

Particulars	Percentage (%)
Male	60
Female	40

Source: Field survey.

Table 2. Age group.

Particulars	Percentage (%)
16-20	70
21-30	20
31-40	10
41-50	00

Source: Field survey.

Table 3. Types of job.

Particulars	Percentage (%)
Full time	26
Part time	74

Source: Field survey.

Table 4. Gender status.

Particulars	Percentage (%)
Male	80
Female	20

Source: Field survey.

Table 5. Age group.

Particulars	Percentage (%)
20-25	15
26-30	25
31-35	50
35 and above	10

Source: Field survey.

Table 6. Types of job.

Particulars	Percentage (%)
Full time	60
Part time	40

Source: Field survey.

Full Length Research Paper

Bank selection criteria in the banking industry: An empirical investigation from customers in Romanian cities

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The present study investigates bank selection criteria of customers in Romania. A total of 248 bank customers responded to the bank selection instrument in two main cities of Romania: Bucharest and Constanta. “The number of ATM (automatic teller machines) booths” has been found to be the most important selection criteria for bank customers from Romania. This study has also shown that providing extensive ATM services, availability of telephone and internet banking, giving personal attention to customers, reputation and image of the banks, confidentiality of the bank for customer records, appearance of staff to be presentable and the number of branch offices around the country are all the most important factors that Romanian people give attention to. Finally, the results of this study have also shown that Romanian people give little attention to mass media advertisement, gifts provided by banks, fast and efficient service and recommendation by other people in their environment. Finally, bank selection criteria statistically differ across cities and income levels in Romania. This shows that people in different cities and in different income groups have different preferences of bank selection criteria in Romania.

Key words: Banking industry, bank selection, criteria, Romania.

INTRODUCTION

The world economy faces an increase in the importance of services industry. The value added of services industry as percent of world gross domestic product was about 70% (World Bank, 2011). On the other hand, the importance of banking and financial services in the world services industry can not be understated (Mishkin, 2001). New technologies and information systems forced these institutions to offer more sophisticated and technological services in the banking and finance industry. Today's competitive financial atmosphere also led banks and financial institutions to improve their service quality and follow new technologies. Nowadays, situation is not much different in the transition economies. Internalization trends in the banking industry of these countries including

Romania has been causing decreasing profit margin and higher competition, hence, compelling banks to increase the level of customer satisfaction.

The issue of bank selection process attracted considerable attention in the bank marketing literature, mainly in the USA (United States of America) and some in Europe and other regions (Lee and Marlowe, 2003; Almossawi, 2001; Gerrard and Cunnigham, 2001; Ta and Har, 2000; Kennington, et al., 1996; Denton and Chan, 1991). The literature has shown that studies made in the countries other than the USA and Europe are quite rare (Gerrard and Cunnigham, 2001). On the other hand, the studies conducted in the field mostly targeted the general population while some focused on some sampled segments (Almossawi, 2001; Gerrard and Cunnigham, 2001; Thwaites and Vere, 1995; Lewis, 1982).

This study focuses on determining the importance bank selection factors of bank customers in Romania, which was the first country of Central and Eastern Europe

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to have official relations with the European Community. Since the Romanian revolution of 1989, European Union (EU) membership has been the main goal of every Romanian Government. The study is important in the sense that it is the first of its kind made for Romanian bank customers, which will be one of the leading studies carried out trying to determine the bank selection criteria in Romania. This study contributes to the literature by comparing bank selection criteria in two different cities of Romania since some studies (Khazeh and Decker, 1992; Kaynak et al., 1991; Ying and Chua, 1989; Laroche et al., 1986) find significant differences in these criteria. Thus, results of this study are expected to provide important implications for policy makers as well as academicians in the relevant literature.

LITERATURE REVIEW

There are extensive studies made in the field regarding the general population and some studies for particular segments of population as mentioned before. This section of the study includes a review of some studies conducted in this field.

Many studies in the literature suggest that convenience of bank location was of paramount importance for customers (Gerrard and Cunningham, 2001; Kaynak and Kucukemiroglu, 1992; Riggall 1979; Laroche et al., 1986; Martenson, 1985; Reed 1972) while some others suggest different criteria to be the most important (Holstius and Kaynak, 1995; Kaynak et al., 1991; Erol et al., 1990; Javalgi et al., 1989). Furthermore, previous studies suggest that bank selection decisions were significantly different across different market segments (Khazeh and Decker, 1992; Kaynak et al., 1991; Ying and Chua, 1989; Laroche et al., 1986).

Lee and Marlowe (2003) used both qualitative and quantitative approaches to clarify how consumers choose a financial institution for their checking account. They found that most consumers value convenience as one of the most important decision-making criteria. Kennington et al. (1996) find that in Poland, as in other countries, the most important factors influencing customer choice are reputation, price and services provided by banks. Khazeh and Decker (1992) found that consumer's choice of a financial institution depends on the service charge policy, reputation and competitiveness of loan rates provided by the institutions. Boyd et al. (1994) conducted a survey and found that the five most important criteria identified by respondents in the USA were bank reputation, interest on saving accounts, interest charged on loans, quick service and location in the city. They also showed that the relative importance of selection criteria varied between groups of respondents. Gerrard and Cunningham (1997) evaluated the bank selection criteria in Islamic banking industry and found that there was general accord as between Muslims and non-Muslims on the rating of the various criteria. They also found five significant

differences between Muslims and non-Muslims, the most relating to "being paid higher interest on savings which was far stronger with non-Muslims. Gerrard and Cunningham (2001) set out to establish a ranking of the various dimensions which influence bank selection decisions of undergraduate students in Singapore and seek to determine how homogeneous undergraduates are in relation to their selection decision. They identified seven bank selection dimensions, the most important being undergraduates should feel secure, while the least important dimension was third party influences.

Ta and Har (2000) examined the predominant factors that have a bearing on undergraduates' bank selection decisions by employing the Analytic Hierarchy Process. They indicated that undergraduates placed high emphasis on the pricing and product dimensions of bank services. Ta and Har (2000) suggest that the undergraduate market could prove to be a profitable market segment for banks. Thus, banks should understand their bank selection decision process. Lewis (1982), on the other hand, reported a high degree of loyalty of students for their banks. Safakli (2007) find that the chief factors determining customers' bank selection in the case of Northern Cyprus are: "Service Quality and Efficiency", "Bank Image", "Convenient Location", "Parking facilities", "Financial factors" and "Affected opinion". Maiyaki (2011) investigate that there are various factors that highly influence the customers' choice of banks in the case of the Nigerian banks such as "the size of bank assets", "availability of large branch network across the country", and "reputation of the bank". Katircioglu et al. (2011) find that there aren't huge differences in the bank selection factors between Turkish and non-Turkish international university students in the case of a state university in North Cyprus. "Availability and convenient location of ATM services" and "speed and quality of service" are the most important factors for considering banks and their services for both Turkish and non-Turkish undergraduate students according to the findings of Katircioglu et al. (2011). Senyuçel (2009) finds that "assurance" is the most important bank selection criteria for Turkish Cypriots where "responsiveness" is the most important bank selection criteria for Greek Cypriots in the Cyprus Island.

METHODOLOGY

Survey design

Survey questions of the questionnaire form was gathered from various studies (Gerrard and Cunningham, 2001; Kennington et al., 1996; Holstius and Kaynak, 1995; Boyd et al., 1994; Anderson et al., 1976) in the relevant literature and revised and adopted to the Romanian banking system.

The instrument has two parts: Demographic profile (4 questions) and Bank Selection Factors (53 questions). A five-point Likert Scale ranging from "Not Important at all = 1" to Very Important = 5" was used to measure 53 items of bank selection factors in the questionnaire form.

Data collection and sample

The data for the study were collected through a non-probability convenience sampling in the main streets of Bucharest and Constanta where most banks are situated. Respondents were randomly stopped and first asked if they were of Romanian origin and if so, were then asked if they had made use of bank services in the last six months. Respondents fulfilling these two criteria were then asked to fill in the questionnaire. The questionnaire forms were distributed to 248 bank customers using and benefiting banking services during September 2010.

Psychometric properties of the scale

Descriptive statistical techniques including mean scores were used to assess bank selection scores of Romanian people. Pre-analysis testing for the suitability of the entire sample for factor analysis was computed for bank selection factors. Thus, the alpha coefficient of reliability level for the instrument was 0.6571. This shows that answers given to the questionnaire instrument of the present study are almost 65.71% consistent; therefore, bank selection factors' instrument is suitable for factor analysis.

Factor loadings for each factor were computed and presented in Table 1. Factor loadings were sorted in descending order and shows that all of the factors loaded since their loadings are higher than 0.50. Thus, these factors were suitable for further analysis in this study since they are also individually consistent (Hair et al., 1998).

Tests for significant differences

In addition of mean score analyses, t and F tests have been employed to see if bank selection criteria of the Romanian bank customers statistically differs in demographic profiles including gender, city, age groups, and income levels; therefore, the following null hypotheses can be established for the present study:

- H₁: Bank selection criteria in Romania do not differ in gender.
- H₂: Bank selection criteria in Romania do not differ across cities.
- H₃: Bank selection criteria in Romania do not differ in age groups.
- H₄: Bank selection criteria in Romania do not differ in income levels.

RESULTS AND DISCUSSION

Out of the total sample size of 248 students, 141 (56.9 %) of the respondents were males and 101 (43.1 %) were females.

Table 2 shows that 111 (44.8%) of respondents live in Bucharest where 137 (55.1%) live in Constanta. In terms of age of respondents great majority are between 21 and 35 (144, 58.1%) and between 36 and 50 (88, 35.5%). Furthermore, 110 (44.4%) of respondents earn between 300 and 500 Euro per month where 66 (26.6%) earn between 500 and 1,000 Euro and 40 (16.1%) earn less than 300 EURO per month.

After considering demographic profile of respondents, now it is time to look at the importance of bank selection factors of people living in Romania from Bucharest and Contanta. Table 3 gives mean scores of bank selection

factors that are sorted in descending order for Romanian people.

As can be seen from Table 3, "The number of ATM (automatic teller machines) booths" is the most important factor for people in Romania (mean score = 4.86) by remembering that item "5" stands for "Very Important" in our instrument.

The great majority of mean score results are close to each other; however, the least important factor for Romanian people is "fast and efficient service" with a very low mean score (1.14) again by remembering that item "1" stands for "Not Important at all" in the instrument. "Telephone banking" (4.83), "providing personal attention to customers" (4.82), "bank's reputation and its image" (4.81), "size of the bank" (4.80), "confidentiality of the bank" (4.80) and "availability of internet banking" (4.80) are the most important factors for bank selection criteria of Romanian people following "the number of ATM booths".

On the other hand, besides "fast and efficient service", "gifts for opening a new account" (2.38), "bank's mass media advertisement" (3.17), "the value of price draws" (3.23), "branch office facilities" (3.24), "recommendation by friends or relatives" (3.25), and "the availability of prize draws" (3.25) are among the least important bank selection criteria for Romanian people.

Finally, t and F test results are presented in Table 4 to test those hypotheses presented previously. F tests using one way ANOVA have been employed for age groups and income levels since these two variables contain more than two items (there are four categories for age and income variable as can be seen from Table 2 as well). Results show that overall bank selection criteria (average of 53 items in bank selection instrument) do not statistically differ in gender and age (since F computed values for gender and age) is not statistically significant and the null hypothesis of "no difference" cannot be rejected) but differ across cities (Bucharest and Constanta) and income levels (F statistics are statistically significant in both cases and the null hypothesis of "no difference" can be rejected). Therefore, the hypotheses H₂ and H₄ of the present study can be rejected while H₁ and H₃ cannot be rejected. To summarize, bank selection criteria in the case of Romania do not statistically differ between personal characteristics such as age and income groups but do differ between different regions of Romania such as Bucharest and Constanta and different income levels; priority for bank selection criteria is different among regions of Romania and among different income levels.

Conclusion

This study has investigated bank selection factors of bank customers from two cities (Bucharest and Constanta) of Romania. As bank customers, "The number of ATM (automatic teller machines) booths" is the

Table 1. Factor loadings of bank selection criteria.

ID	Important factor for bank selection	Factor loading
1.	Counter partition in bank	0.82
2.	Confidentiality of the bank	0.81
3.	Gifts for opening a new account	0.76
4.	Branch office facilities	0.75
5.	Credit card offered by the bank	0.74
6.	Location near home/work	0.74
7.	Staff give adequate explanation of services and products	0.74
8.	Knowledge and skills of bank employees	0.74
9.	Loans with favorable terms	0.73
10.	Longer banking hours	0.73
11.	The availability of ATMs	0.73
12.	Accuracy of transactions	0.73
13.	Internal appearance of the bank	0.73
14.	Banks mass media advertisement	0.72
15.	Higher interest payment savings	0.72
16.	Respect and consideration shown by the employees	0.72
17.	Appearance of staff	0.71
18.	External appearance of bank	0.71
19.	Interior layout of the bank	0.71
20.	Bank's reputation and its image	0.71
21.	Bank employees know my personal needs	0.70
22.	A wide range of services offered	0.70
23.	Reliability of staff	0.70
24.	Availability of credit cards with favorable terms	0.70
25.	Size of the bank	0.70
26.	Willingness of staff to help the problems or queries	0.70
27.	Being informed of the new services or products	0.70
28.	Interior comfort	0.70
29.	Interesting advertising	0.69
30.	The availability of information in the branch	0.69
31.	The value of price draws	0.69
32.	Recommended by friends or relatives	0.69
33.	Fast and efficient service	0.69
34.	Availability of parking space	0.67
35.	Speed of the service at the cash point	0.67
36.	Lower service charges for bill payments and other services	0.66
37.	The number of ATM booths	0.66
38.	The number of staff available to serve	0.66
39.	Availability of Internet banking	0.65
40.	The availability of prize draws	0.64
41.	Perceived confidentiality of bank	0.64
42.	Friendliness of bank personnel	0.64
43.	Financial counseling services	0.64
44.	Availability of Telephone banking	0.61
45.	Speed of the service in the branch	0.61
46.	The number of branch offices in the country	0.60
47.	External appearance of bank	0.59
48.	Confidence in bank manager	0.58
49.	Higher interest on savings and deposits	0.57
50.	Lower interest charges on loans	0.57
51.	Bank employees give me personal attention	0.56

Table 1. Contd.

52.	Lower loans interest rate charges	0.56
53.	Honesty and trustworthiness of staff	0.55

Table 2. Demographic breakdown of bank customers (n=248).

Demographic	Frequency	Percent
Gender		
Male	141	56.9
Female	107	43.1
Total	248	100.0
City		
Bucharest	111	44.8
Constanta	137	55.1
Total	248	100.0
Age		
Less than 21	9	3.6
21 – 35	144	58.1
36 – 50	88	35.5
51 and Upper	7	2.8
Total	248	100.0
Income level (Euro)		
Less than 299	40	16.1
300 – 499	110	44.4
500 – 999	66	26.6
≥1,000	32	12.9
Total	248	100.0

most important selection criteria for people from Romania; this finding is similar to the results of Katircioglu et al. (2011) where the most important one was the availability of ATMs in the case of North Cyprus. This study has investigated that bank selection factors do not largely differ from one factor to another with some exceptions covering the least important ones for the customers living in Romania. Katircioglu et al. (2011) have found that factors do not differ in nationality as well. This study has also shown that providing extensive ATM services, availability of telephone and internet banking, giving personal attention to customers, reputation and image of the banks, confidentiality of the bank for customer records, appearance of staff to be presentable and the number of branch offices around the country are all the most important factors that Romanian people give attention to. Finally, the results of this study have also shown that Romanian people give little attention to mass media advertisement, gifts provided by banks, fast and

efficient service and recommendation by other people in their environment. Finally, bank selection criteria statistically differ across cities and income levels in Romania. This shows that people in different cities and in different income groups have different preferences of bank selection criteria in Romania. Some of the previous studies (Khazeh and Decker, 1992; Kaynak et al., 1991; Ying and Chua, 1989; Laroche et al., 1986) also investigate that bank selection decisions were significantly different across different market segments. The present study did not find any statistically significant difference between males and females, and between different age groups in Bucharest and Constanta.

Since the present research has shown that “providing extensive ATM services”, “availability of telephone and internet banking”, and “the number of branch offices around the country” are the most important factors behind bank selection in Romania, the authorities should focus and make more investment on facilitating banking

Table 3. Importance of bank selection factors of customers (n = 248).

ID	Factor for bank selection	Mean score
1.	The number of ATM booths	4.86
2.	Availability of Telephone banking	4.83
3.	Bank employees give me personal attention	4.82
4.	Bank's reputation and its image	4.81
5.	Size of the bank	4.80
6.	Confidentiality of the bank	4.80
7.	Availability of Internet banking	4.80
8.	Appearance of staff	4.79
9.	The number of branch offices in the country	4.77
10.	The availability of ATMs	4.77
11.	Honesty and trustworthiness of staff	4.77
12.	Staff give adequate explanation of services and products	4.76
13.	Longer banking hours	4.75
14.	Financial counseling services	4.72
15.	The availability of information in the branch	4.69
16.	Interior comfort	4.21
17.	Bank employees know my personal needs	4.20
18.	Friendliness of bank personnel	4.17
19.	Loans with favorable terms	4.16
20.	Lower loans interest rate charges	4.16
21.	Speed of the service in the branch	4.16
22.	Location near home/work	4.16
23.	Willingness of staff to help the problems or queries	4.15
24.	External appearance of bank	4.15
25.	The number of staff available to serve	4.13
26.	Lower service charges for bill payments and other services	4.12
27.	A wide range of services offered	4.12
28.	Interesting advertising	4.11
29.	Respect and consideration shown by the employees	4.10
30.	Accuracy of transactions	4.07
31.	Reliability of staff	4.07
32.	Credit card offered by the bank	4.07
33.	Interior layout of the bank	4.06
34.	Lower interest charges on loans	4.06
35.	Availability of credit cards with favorable terms	4.06
36.	Internal appearance of the bank	4.05
37.	Availability of parking space	4.02
38.	Speed of the service at the cash point	4.02
39.	Knowledge and skills of bank employees	4.01
40.	Being informed of the new services or products	4.01
41.	Counter partition in bank	4.00
42.	External appearance of bank	3.98
43.	Perceived confidentiality of bank	3.96
44.	Higher interest on savings and deposits	3.30
45.	Confidence in bank manager	3.29
46.	Higher interest payment savings	3.27
47.	The availability of prize draws	3.25
48.	Recommended by friends or relatives	3.25
49.	Branch office facilities	3.24
50.	The value of prize draws	3.23
51.	Banks mass media advertisement	3.17

Table 3. Contd.

52.	Gifts for opening a new account	2.38
53.	Fast and efficient service	1.14
	Overall Instrument	4.07

Table 4. Tests for significant differences.

Demographic	Test statistic
Gender	
Male	t-stat: -1.153
Female	
City	
Bucharest	t-stat: 7.879*
Constanta	
Age	
Less than 21	
21 – 35	F-stat: 0.654
36 – 50	
51 and Upper	
Income Level (Euro)	
Less than 299	
300 – 499	F-stat: 2.170***
500 – 999	
≥1,000	

* and *** denote the rejection of the null hypothesis respectively at 0.01 and 0.10 levels.

procedures of customers more by using and improving the contemporary technology. The results have shown that these are must in the Romanian case. Banks should also encourage and train their staff for individual customer satisfaction as well since “giving personal attention to customers” and “appearance of staff to be presentable” are also found as an important selection criteria for the Romanian bank customers. It is important to note that these policies should be followed no matter customers are males or females, or in different age groups since this study did not find any significant differences of bank selection factors in gender and age groups; but, they should be implemented may be with city or location-specific characteristics due to the fact that bank selection criteria have shown significant differences between Bucharest and Constanta according to the results of the present study.

The authors of the present study have faced difficulties in distributing questionnaires from bank customers; as a research limitation it is important to mention that participants many times find it boring and time consuming

to response to a survey in any field of topic. Further research can be carried out for positioning studies for the banks in Romania, where strategic positioning has become increasingly relevant and important for the banking sector since they joined the European Union. The survey can be also carried out in the other cities of Romania for comparison purposes.

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Full Length Research Paper

Technical efficiency changes at the farm-level: A panel data analysis of rice farms in Bangladesh

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This paper examines technical efficiency changes at the farm-level for rice farms in Bangladesh over a 17 year period (1987 to 2004) using nationally representative panel data. Results from the stochastic production frontier analysis indicate that technical efficiency of the rice farmers has declined from 83% to 60% over this period due to a host of farm as well as socio-economic factors. Age, education, tenure status and involvement in off-farm work are factor negatively influencing technical efficiency while the relationship with farm size is positive. Under the current production technology and input use, 40% higher production could be reached by removing technical efficiency which is substantial. Policy recommendations include consolidation of land and strengthening of extension services.

Key words: Technical efficiency, rice farms, efficiency elasticity, panel data, Bangladesh.

INTRODUCTION

Rice is the staple food for the population of Bangladesh. The per capita rice consumption in Bangladesh is 441 g/day and more than 70% of total calorie intake comes from rice (Kenny, 2001). Rice contributes for 60% of the agricultural gross domestic production (GDP) which in turn accounts for about a third of the national GDP (BBS, 2009). As one of the most densely populated countries of the world, with a population already 140 million due to top population growth Bangladesh needs to feed an extra two million people every year (BBS, 2009). So, the central focus of agricultural policy and development efforts in Bangladesh is focused on increasing rice production maintaining food security and becoming self sufficient. However, although various policies have been undertaken since its independence in 1971 but success in realizing such an ambitious target remains elusive as the

the country is still identified as one of the food deficit countries of the world. Although overall rice production steadily increased over the time, over-all food-security and self sufficiency is far from being achieved.

There is a consensus in the research arena and in the policy forum that long-term food security could be achieved by promoting productivity and output growth in the agricultural sector, particularly the rice sector. Many researchers (Hayami and Ruttan, 1985; Kuznets, 1966) advocate the adoption of new technologies to increase farm productivity. However, after observing the results of the green revolution in developing countries across the world, researchers and policy makers argue that productivity gains could also be possible by efficient use of the existing technology rather than introducing new technology (Bravo-Ureta and Pinheiro, 1997; Squires and Tabor, 1991) which may take a longer time from invention to adoption at the farm level.

It is imperative that the productivity of rice farmers in Bangladesh can be raised either by the adoption of improved production technologies or improvements in

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efficiency or reconciling both. Therefore, technological progress in rice cultivation is crucial for sustaining food production and food security in Bangladesh. Although, Bangladesh has made remarkable progress in sustaining a positive growth in rice production over the last three decades through the adoption of high yielding modern varieties (MVs) of rice (Hossain et al., 2006), the yield per hectare remains much lower than in the other major rice producing countries in Asia. For example in 2000, average paddy production per hectare was 6800 kg in Korea republic, 6582 kg in Japan, 6300 kg in China, 4300 kg in Indonesia, and only 3465 kg in Bangladesh (FAO, 2009). As expansion and adoption rate of modern rice technologies by the farmers in Bangladesh is reaching its ceiling level (Baffes and Gautam, 2001), improvement in efficiency is probably the best and maybe only option in enhancing productivity. Many studies were conducted on estimating efficiency of farms in developing countries applying either the parametric stochastic frontier approach (SFA) or the non-parametric data envelopment analysis (DEA). Thiam et al. (2001) summarizes 51 studies on technical efficiencies in developing countries from all over the world. In Bangladesh, there are only a few studies that estimated efficiency at the farm-level (Salim and Hossain, 2006; Rahman, 2007; Wadud and White, 2000; Sharif and Dar, 1996). All these studies use only cross-sectional data. To our knowledge, no studies investigated technical efficiency (TE) of rice farmers at the farm-level in Bangladesh over time using a nationally representative panel data set, although regional level panel-data were utilized by Coelli et al. (2003) and Rahman (2007). Our main contribution to the existing literature is to fill this gap in knowledge by estimating and trying to explain the changes over time in production performance at the farm-level. The main objective of this paper is thus to identify the changes in farm-level technical efficiency over time for rice farms in Bangladesh, which is the key sector to sustain agricultural growth of the economy. Next it also examines the factors that affect farm-level technical efficiency. In this paper we apply a stochastic frontier production function model, in which the technical efficiencies of farms are allowed to vary over time.

THEORETICAL STOCHASTIC FRONTIER MODEL

The stochastic frontier approach (SFA) was for the first time independently proposed by Aigner et al. (1977) and Meeusen and Van den Broeck (1977). SFA has contributed significantly to the literature by using econometric modeling of production and technical efficiency of farms both in a static or a dynamic framework. SFA involves two random components, one associated with the presence of technical inefficiency and the other being a conventional random error. The advantage of the SFA is its capability to measure the efficiency in the presence of

statistical noise. Applications of frontier functions have involved both cross-sectional and panel data. In our study we use a panel data set as it is more informative and is able to capture dynamic behavior (Baltagi and Song, 2006). Specifically there are some advantages in using panel data instead of a cross section or time-series data (Hsiao, 2003 and Baltagi, 2005). These are: (1) Panel data have more variability and less collinearity among variables, (2) panel data controls individual heterogeneity and, therefore, able to get unbiased estimates and (3) able to identify and estimate effects which are not detectable in a cross-section or a time-series data. The SFA approach can effectively handle statistical noise in panel data but is adversely affected by measurement error when applied to cross-sectional data. Furthermore, Sickles (2005) and Gong and Sickles (1992) showed that the panel data version of the stochastic frontier model works well. This is because the panel data model incorporates additional information from the times-series nature of the data as well as the distributional assumptions, which allow estimation via the method of maximum likelihood (ML). A panel data stochastic frontier model also has advantages over DEA (data envelopment analysis), which typically relies on cross-sectional data to estimate efficiency (Ruggiero, 2007). Therefore, we choose to apply SFA with a simple exponential specification of time-varying farm effects using a balanced panel of 73 farms over T (1987, 2000 and 2004) periods to estimate efficiency.

The stochastic frontier production function with a simple exponential specification of time varying farm effects can be defined as following Equation (1):

$$Y_{it} = f(X_{it}; \beta) \exp(V_{it} - U_{it}) \quad (1)$$

$$U_{it} = \eta_{it} U_i = \{\exp[-\eta(t-T)]\} U_i \quad t \in I(i); i=1,2,\dots,N;$$

where the dependent variable Y_{it} represents total rice production (kg/farm) by the i -th farm in the t -th time period, X_{it} denotes n -th factor inputs associated with the production of the i -th farm in the t -th year, β is the vector of unknown parameters to be estimated; the statistical noise V_{it} are assumed to be identically and independently distributed (i.i.d) $\{N(0, \sigma_v^2)\}$ random errors. The other error components U_{its} are assumed to be i.i.d non-negative random variables truncated at zero. The values of U_{it} range between zero and one, where 1 indicates full technical efficiency and 0 indicates full technical inefficiency. In this model the time trend (t) also interacts with the inputs (land, seed, fertilizer labour and pesticides) which allows for non-neutral technical change. We also include time squared variable in this model which allows for non-monotonic technological change, η is an unknown scalar parameter, $I(i)$ corresponds to the set of T_i time periods among the T periods involved for

which observations for i -th farm are obtained. The model followed the structure of Battese and Coelli (1992).

The technical efficiency of an individual farmer is defined as the ratio of the observed output to the corresponding frontier output given the available

technology. The minimum mean squared error predictor of the technical efficiency of the i -th farm at the t -th time period $TE_{it} = \exp(-U_{it})$ can be calculated by using Equation (2):

$$E[\exp(-U_{it})|E_i] = \left\{ \frac{1 - \Phi \left[\frac{\eta_{it} \mu^*_{i1} - (\mu^*_{i1} / \sigma^*_{i1})}{\sigma^*_{i1}} \right]}{1 - \Phi \left(-\frac{\mu^*_{i1}}{\sigma^*_{i1}} \right)} \right\} \exp \left[-\eta_{it} \mu^*_{i1} + \frac{1}{2} \eta_{it}^2 \mu^*_{i1}{}^2 \right] \quad (2)$$

Where

$$\mu^*_{i1} = \frac{\mu \sigma^2_v - \eta'_i E_i \sigma^2}{\sigma^2_v + \eta'_i \eta_i \sigma^2} \quad \text{and} \quad \sigma^*_{i1} = \frac{\sigma^2_v \sigma^2}{\sigma^2_v + \eta'_i \eta_i \sigma^2}$$

E_i stand for the $(T_i \times 1)$ vector of E_{it} 's correlated with the time periods observed for the i -th farm, where $E_{it} = V_{it} - U_{it}$; η_{it} represents the $(T_i \times 1)$ vector of n_{it} associated with the time periods observed for the i -th farm; and $\Phi(\cdot)$ represents the distribution function for the standard normal random variable.

However, U_{it} could decrease, remain constant or increase as t increases, if $\eta > 0$, $\eta = 0$ or $\eta < 0$, respectively. The case in which η is positive is likely to be appropriate when farms tend to improve their level of technical efficiency over time and a negative value for η means that the level of technical efficiency declines over time.

PANEL DATA

The data for this analysis are drawn from a repeated survey of a nationally representative sample of rural households. The 1987–1988 Survey was conducted by the Bangladesh Institute of Development Studies (BIDS) on 1240 rural households from 62 villages of 57 out of 64 total districts in Bangladesh for a research on technological progress (Hossain et al., 1994; David and Otsuka, 1994). The representative sample was drawn by using a multistage

random sampling method. First, 64 unions (small administrative unit) were randomly selected from a list of all unions in the country, and then one village was selected from each union. A random sample of 20 households was drawn from each village. The 1999 to 2000 survey was conducted by the IRRRI from the same villages for a research on poverty dynamics. A sample of 30 to 31 households from each of the 62 villages (1880 households) was drawn using stratified random sampling. The 2004 - 2005 survey was also conducted by IRRRI and covered the same households as in the first two surveys of 1987 to 1988 and 2000 to 2001. In the 2004 to 2005 survey, the total sample size rose to 1927. The sample of these three surveys is nationally representative as documented by Hossain et al., 1994; Rahman and Hossain 1995.

However, because of the objective of our paper, we need to use farm level panel data. Therefore, we consolidated the same farm households who are present in all three surveys so that we get a balanced panel for a cohort of 73 farm households. The total observation stands at 219 and covers 26 administrative districts, thereby making our data-set nationally representative.

MODEL SPECIFICATION AND HYPOTHESES TESTS

The functional form of the model is determined by testing the adequacy of a restrictive Cobb–Douglas versus a flexible translog production function representation of the production technology. The Cobb–Douglas and the translog production frontier models are respectively defined as in Equations (3) and (4):

$$\ln Y_{it} = \alpha_o + \sum_{n=1}^N \alpha_n \ln X_{it} + \alpha_t t + \frac{1}{2} \alpha_{tt} t^2 + v_{it} - u_{it} \quad (3);$$

where, $i=1, 2, \dots, I$ and $t=1, 2, \dots, T$, and

$$\ln Y_{it} = \alpha_o + \sum_{n=1}^N \alpha_n \ln X_{nit} + \frac{1}{2} \sum_{n=1}^N \sum_{j=1}^N \alpha_{nj} \ln X_{nit} \ln X_{nit} + \sum_{n=1}^N \alpha_{nt} t \ln X_{nit} + \alpha_t t + \frac{1}{2} \alpha_{tt} t^2 + v_{it} - u_{it} \quad (4)$$

Where, $\ln Y$ is the natural log of rice output, and $\ln X_i$ are the natural log of land, seed, fertilizer, labour and pesticides costs, t is a time trend. We use the mean differenced variables for estimation in order to obtain output elasticities directly. The frontier results are obtained by using the software Frontier 4.1 of Coelli (1994).

Based on the existing literatures (Bravo-Ureta and Evenson,

1994; Amara et al., 1999; Wilson et al., 2001; Coelli et al., 2002; and Kamruzzaman et al., 2007) we hypothesized some socio-economic characteristics of the farmer as well as of the farm for identifying the determinants of rice farmers' efficiency in Bangladesh. We have used the model in Equation (5) to identify determinants of technical efficiency because the dependent

Table 1. Descriptive statistics of the variables for frontier and Tobit model.

Variable	Measure used	Mean	Standard deviation	Min.	Max.
Rice output	Kilogram	3674.75	4135.24	133.97	22162.5
Cultivated land total	Decimal	133.61	149.47	10	1006
Labour	Man-days	87.68	113.60	5	699
Seed	Kilogram	72.40	93.67	2.5	750
Fertilizers	Kilogram	159.08	336.64	113.61	319.62
Pesticides	Taka	145.41	319.63	0	2348.49
Age	Years	45.94	12.58	22	92
Education	Years of schooling	6.76	5.45	0	14
Household size	Number	6.85	3.38	3	21
Farm size	Decimal	285.15	228.77	12	1299
Extension	Dummy	0.33	0.47	0	1
Tenurial Status	Proportion to total	1.89	6.87	0	66.7
Off-farm work	Dummy	0.70	0.46	0	1

N, P and K stands for nitrogen, potash and phosphate; min and max denotes minimum and maximum.

Table 2. Tests of hypotheses results.

Null hypothesis	LR statistics (χ^2)	Degrees of freedom	p-value (Prob. > χ^2)	Decision
1. $H_0: \alpha_{jk} = 0$ for all jk	83.61	21	0.00	Reject H_0
2. $H_0: \mu = \gamma = 0$	16.53	5	0.000	Reject H_0
3. $H_0: \alpha_5 = \alpha_{51} = \dots = \alpha_{55} = 0$	32.63	6	0.000	Reject H_0
4. $H_0: \eta = 0$	4.24	1	0.000	Reject H_0

variable 'technical efficiency' is a censored variable with an upper limit of one. The specification of the model is defined as (5):

$$TE_{it} = X_{it}\beta_i + u_i \quad (5)$$

Where $TE_{it}^* = \beta'X_{it} + \varepsilon_i$ and

$$TE_{it} = TE_{it}^* \text{ if } TE_{it}^* > 0, \text{ and } TE_{it} = 0$$

Where $\varepsilon_i = N(0, \sigma^2)$, TE_{it} is the estimated technical efficiency of the rice farmer; X_{it} is the explanatory variables and β are unknown parameters. The explanatory variables are age (G is the age of the farmer in years); education (ED is the educational level of the farmer in schooling years); household size (HhS is the number of people in household including household head and permanent hired labour); farm size (in decimal); extension (with Ext a contact dummy with the value 1 is if farmer has contact with agricultural extension workers and the value 0 otherwise); tenure status (TU is proportion of rented-in land cultivated by the farm household); off-farm work (Off is a dummy value with 1 if farmer has chance to engage off farm work and the value 0 otherwise). ε is an error term which follows Gaussian process. We estimate the Tobit model with the help of STATA software package. Summary statistics of the variables used in all the models are presented in Table 1. Rice output includes all seasons and all rice varieties.

Hypothesis tests

A set of hypothesis tests were performed by using likelihood-ratio (LR) statistic to determine the preferred functional form and the distribution of the random variables which is associated with the existence of technical inefficiency and the residual error term. Hypotheses test results are presented in Table 2.

First hypothesis was conducted to determine the functional form - Cobb–Douglas versus translog function. The null hypothesis of Cobb–Douglas production function is an adequate representation ($H_0: \alpha_{jk} = 0$) for all jk is strongly rejected, therefore the choice of translog production function seems a better representation of the production technology of rice farmers in Bangladesh.

The parameter γ is the ratio of the error variances which is $\gamma = \sigma_u^2 / (\sigma_v^2 + \sigma_u^2)$. The value of γ is in the range of zero (means no technical inefficiency) to one (means no random noise). The test of significance of the inefficiencies in the model rejected the null hypothesis ($H_0: \mu = \gamma = 0$) and supports the existence of inefficiency effect.

The null hypothesis of no technical change over time ($H_0: \alpha_5 = \alpha_{51} = \alpha_{55} = 0$) also got strongly rejected which indicate that there is a technical change. The magnitude and direction will be determined and discussed in the next section.

At the end, the null of time varying technical inefficiency ($H_0: \eta = 0$) is also rejected, which testifies that the technical

Table 3. Estimates of stochastic production frontier using translog specification.

Regressors	Coefficient	S.E	t-ratio
Constant	0.161	0.183	0.87
Land (decimal)	0.270***	0.087	3.09
Labour (man-day)	0.039	0.043	0.46
Fertilizer (kg)	0.091*	0.052	1.75
Seed (kg)	0.607***	0.086	14.16
Pesticides	0.043***	0.013	3.30
Time	0.328**	0.122	2.68
Land2	0.0887	0.365	0.24
Labour2	-0.153	0.330	-0.46
Fertilizer2	-0.008	0.040	-0.19
Seed2	0.173***	0.068	2.55
Pesticides2	0.008***	0.003	3.03
Land*labour	0.421	0.311	1.35
Land*fertilizer	-0.146	0.109	-1.33
Land*seed	-0.284**	0.117	-2.43
Land*pesticide	-0.014	0.016	-0.91
Labour*fertilizer	0.037	0.108	0.36
Labour*seed	-0.159	0.116	-1.36
Labour*pesticides	0.022	0.014	1.58
Fertilizer*seed	0.105*	0.056	1.86
Fertilizer*pesticide	-0.008	0.006	-1.36
Seed*pesticide	-0.023***	0.006	-3.59
Time*land	-0.122	0.167	-0.73
Time*labour	-0.135	0.181	-0.75
Time*fertilizer	0.116	0.100	1.16
Time*seed	0.213**	0.089	2.40
Time*pesticide	-0.015	0.009	-1.54
Time*time	-0.523**	0.199	-2.62
Diagnosis statistics			
σ^2	0.173***	0.022	7.98
γ	0.429***	0.102	3.92
μ	0.527*	0.283	1.85
η	-0.541**	0.217	-2.49
Log likelihood value	-84.62		

*, **, *** denotes significant at 10, 5 and 1% level respectively, the total number of observation is 219.

efficiency levels vary significantly over time as will be found out and discussed later.

RESULTS AND DISCUSSION

Estimates of production function

The parameter estimates of the translog stochastic frontier production function are reported in Table 3. In our model, the estimated coefficients are directly the output elasticities because we have used the mean-differenced variables ($x_i^* = x_i - \bar{x}$).

The estimated coefficients on the land, fertilizer, seed and pesticides are significantly different from zero and have the expected positive signs. This indicates that all inputs tested (seed, fertilizer, land and pesticide) appear to be a major determinant of rice production in Bangladesh except labour. However, output elasticity of seed is the highest and estimated at 0.60 followed by land at 0.27 and fertilizer at 0.09, pesticide and labour at 0.04, respectively. Output elasticity of seed is estimated at 0.60 indicating that a 10% increase in seed use will increase output by 6%. Similarly, output elasticity of fertilizer is estimated at 0.09 indicating that a 10% increase in fertilizer consumption will increase output by 0.9%.

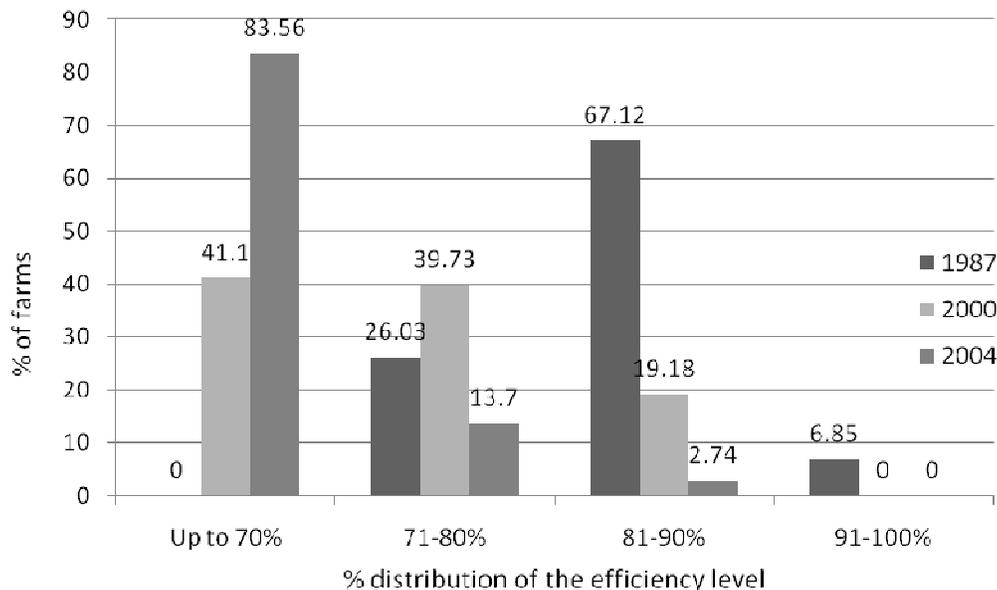


Figure 1. Distribution of the farms' technical efficiency.

Table 4. Descriptive statistics of farms' technical efficiency (%).

Variables	1987	2000	2004
Mean efficiency	0.83	0.74	0.60
Standard deviation	0.05	0.07	0.10
Max	0.93	0.88	0.81
Min	0.72	0.58	0.39

The sum of elasticities is equal to 1.05 implying nearly constant returns to scale in production. The null hypothesis of constant returns to scale cannot be rejected. The coefficient on the time-trend variable is 0.33 and is statistically significant, which indicates positive technological change over the studied period. In this case, the frontier has shifted towards the right. However, the coefficient of η (the time-varying efficiency effect) is negative (-0.54) and significantly different from zero. It indicates that the technical efficiency has declined over time (Table 3). Similar results were also found by Coelli et al. (2003). They found that technical efficiency declined over the time at the rate of 0.47% per annum. The result reveals that the farmers are very far from their frontier and the gap is increasing over the time, thereby implying that the production potential has not been realized at the farm-level. Figure 1 presents the frequency distribution of farm efficiencies over time. In 2004, 83.56% farms were in 0 to 70% efficiency group while in 1987 no farm was found in this low performance group. In 1987 highest percentage (67.12%) of farm belongs to 81 to 90% efficiency group, while in 2004, only 2.74% of farms were in this group.

The summary statistics of mean efficiency level are presented in Table 4. In 1987 mean efficiency level was 83%, in 2000 it stands at 74% and in 2004 it reduced to 60%. The estimates of 1987 and 2000 are slightly lower than those reported by Rahman (2007), Wadud and White (2000), Sharif and Dar (1996). It is evident from Table 4 that the mean efficiency level has declined substantially over time and has declined at an increasing rate. The variability of efficiency has also increased at an increasing rate over time.

Efficiency elasticities

The results of efficiency elasticities are presented in Table 5. To calculate efficiency elasticities at first we find out the variables those effecting efficiency, then we calculate the efficiency elasticities of those variables. The regression results show that age, educational level, farm size, tenure status and opportunity of off-farm work have a significant impact on technical efficiency of rice farmers.

The elasticity estimate reveals that a 1% increase in age reduces technical efficiency by 0.002% (Table 5).

Table 5. Efficiency elasticities.

Explanatory variable	Coefficient	t-value
Constant	0.8204***	25.76
Age	-0.0023***	-3.78
Education	-0.0040***	-2.86
Household size	0.0030	1.24
Farm size	0.0001***	3.49
Extension	0.0234	1.46
Tenure	-0.0021**	-1.92
Off farm work	-0.0321*	-1.89

*, **, *** means significant at 10, 5 and 1% level respectively.

The negative sign of age implies that older farmers are technically less efficient than younger farmers. The result is expected as older farmers are likely to be more conservative towards new technologies, ideas and new practices than younger farmers. The similar negative sign of age were reported by Wadud and White (2000) and Balcombe et al. (2008).

The elasticity estimate reveals that a 10% increase in educational level reduces technical efficiency by 0.04%. An unexpected negative sign of education variable is not shocking, as the educational level of the people engaged in agricultural farming in Bangladesh is very low. In Bangladesh it is unlikely that educated people remain in agriculture because it seems to be less remunerative for them. Therefore, the negative influence of education on technical efficiency is not surprising at all. Similar results were also reported by Wadud and White (2000), Coelli et al. (2003), and Rahman and Shankar (2009).

The elasticity estimate reveals that a 10% increase in farm size will increase efficiency by 0.001% which is substantial. Farm size variable has the expected sign and is significant. Kamruzzaman et al. (2007) found similar results for Bangladeshi wheat farmers. The farm size positively influences technical efficiency implying that larger farms are more efficient than smaller farms. It is not unlikely that large farms can quickly utilize existing resources and might have a greater ability to access modern inputs on time.

Tenancy (defined as the proportion of rented-in land cultivated by the farm households) has a significantly negative impact on technical efficiency. It means that farms with a large proportion of rented-in land are less efficient than farmers cultivating owned land. The elasticity of tenancy estimate reveals that a 10% increase in the proportion of rented-in land to total cultivated land will decrease efficiency by 0.02%. The results is not unexpected because Coelli et al. (2002) and Rahman and Rahman (2009) also found similar results.

Off-farm work also has negative impact on efficiency and it is significant. The elasticity of off farm work that is access to non-agricultural income) estimate reveals that

a 10% increase in the opportunity of off farm work will decrease efficiency by 0.3%. If the farmer has an opportunity to be engaged in off farm work then it is natural that they pay less attention to farming. Thus, opportunities for off farm work reduces technical efficiency, as expected. Rahman and Rahman (2009) and Balcombe et al. (2008) also reported parallel results.

However, household size (number of family members) and extension contact variables are not significant but have the expected signs. The extension contact help farmers to develop their analytical skills, critical thinking and creativity, and enable them learn to make better decisions. The poor effect of agricultural extension programs in farming is not unexpected. Similar results have been reported in past analyses of the productivity of agriculture in developing countries by Feder et al. (2004). The implication of positive sign of household size is that the larger households can substitute family farm workers with hired farm workers and, therefore, affect positively to technical efficiency.

Conclusions

The paper used the stochastic frontier production function with time varying farm effects model to examine the changes in technical efficiency at the farm-level for rice farms in Bangladesh using a balanced panel data for a cohort of 73 farms over a 17 year period (1987 to 2004). Our results indicate that the technological progress increased and has contributed to output significantly but that technical efficiency has declined over the study period. It was 60% in 2004 whereas it was 74 and 83% in 2000 and 1987 respectively. These numbers indicate that rice farmers are not fully efficient in Bangladesh and that the level of technical efficiency is decreasing over time at the farm-level. Thus, there remains considerable scope to increase production by improving efficiency of Bangladeshi rice farmers.

The farm-specific variables are used to explain technical inefficiencies and indicate that those farmers

who are young and have larger farms and do less off-farm work tend to be more efficient. Owner operators are clearly more efficient than the tenants. Extension services have a positive but not significant influence in increasing efficiency in rice farming showing their poor performance. Since the technical efficiency has declined over time, it is of utmost importance to design appropriate policies to improve efficiency at the farm level. From policy point of view, consolidation of land ownership can improve the technical efficiency level of rice farms. However, consolidation is a long term process. In short time inefficiency in rice farming can be reduced significantly by strengthening extension services and to increase their performance. We therefore, recommend paying more attention on this aspect in attempt to increase efficiency and to contribute to increased factor productivity and output growth.

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Full Length Research Paper

Determination of customer value measurement model RFM index weights

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How to measure customer value and segment customers in order to do target marketing is a problem that many enterprises concern about. As a method of measure customer value, recency, frequency, monetary (RFM) had applied in many enterprises. Usually index weights of RFM model were determined by analytic hierarchy process (AHP) through experts' scores, this method was affected by experts' subjectivity. This paper presented a method of starting from enterprise' sale data, constrained by the fact the sum of the index weights were 1. According to rule of the index weights of RFM under the biggest response rate were the enterprise's best RFM index weights, objectively determined RFM index weights. This method made the determination of RFM index weights conform to the enterprise objective situation, thus it provided a feasible method for the enterprise customer management.

Key words: RFM model, analytic hierarchy process, customer value.

INTRODUCTION

Customers are obviously the source of revenue for any enterprise and winning new customers or encouraging precious customers to purchase more is the primary objective of every enterprise. In this process, the 20/80 principle (Schmittlein, 1993) first postulated by Italian economist Pareto (1906) is still valid. This principle states that most enterprise profits come from a few valuable customers, in fact 80% of the revenue comes from only 20 of the customers. Hence, identifying the most valuable customers of an enterprise and based on their purchasing characteristics and then to recommend other goods suiting their preferences in order to enhance future purchases for enterprise is a continually pursued goal.

Bob Stone (1994) suggested using recency, frequency, monetary (RFM) model to assess customer value. Bob Stone (1994) pointed out that in a period time, customers who purchase more recently are more inclined to buy again than those purchased earlier. Customers who purchase often are more inclined to buy again than those purchased infrequent. Customers who spend more are

more inclined to buy again than those who spend less. This indicates that a relationship between customers' past purchasing behavior and their future purchase probabilities exists. Many scholars and business experts as well as most businesses would like to be able to predict and/or encourage future sales based on previous customer activity. Bob thinks the weights of various indexes in the RFM model are different and are dependent on industry characteristics. Hughes (1994) thinks that the various index weights in the RFM model are consistent cross industries. Currently there is a lot of literatures (Satty, 1980; Liu et al., 2005; Shen et al., 2009; Deng et al., 2008) on the use of the analytic hierarchy process (AHP) to determine the weight of each index in the RFM model, but this method depend on the expert's experience and is therefore subjective. Experts can be chosen from administrators, market consultant, or customers in order to obtain various representative aspects on customer preferences, but the results will all be subjective based on the expert's individual thinking. Because different index weights on RFM make enterprise have different segment customer methods, thus, how to get proper index weights on FRM is very important for enterprises to find most valuable customers and do effective customer management so that improve enterprise's

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economic revenue.

The purpose of this paper is to propose an objective method to determine RFM index weights based on customers' purchasing data. First qualitative analysis of the R, F, M relationship of RFM model; second constrained by the fact the sum of the indexes weight is 1, on the basis of various combinations of the three index weights are tried using different step gradients of 0.1 (Greater precise might be obtained by using smaller step gradients, such as 0.01 and so on); third according to rule of the index weights of RFM under the biggest response rate were the enterprise's best RFM index weights, objectively determined RFM index weights. Finally, based on the weights thus determined, the value of each customer to the enterprise is calculated by RFM index weighted algebra.

Enterprises can segment customers according to customer value by clustering and provide a feasible method to do target marketing.

METHODOLOGY

Determination of RFM index weights

Data standardization

In the RFM model, R indicates the day/week/year from the date of the customer's last purchase to statistical date. Statistically, the larger this value (the greater the lapse time) the lower the probability the customer will buy again. F is a frequency that the customer purchases products during the statistical cycle. The higher the frequency means the higher the possibility the customer will make future purchases. M is the value for the total purchases by a customer in the statistical cycle. The higher the M Value the higher the probability the customer will buy again. In the RFM model, R, F, and M have different units and F, M have a positive impact on future purchases while R has a negative impact. In order to facilitate the analysis the RFM data must be standardized (Sohrabi et al., 2007) as follows:

$$R' = \frac{R^L - R}{R^L - R^S} \quad (1)$$

Where R' is the value after standardization, R is the customer's recency value for the selected statistical cycle, R^L , R^S are the maximum and minimum values respectively for the all customers activity during the selected statistical cycle.

For Frequency value F, the standardization is determined by:

$$F' = \frac{F - F^S}{F^L - F^S} \quad (2)$$

Where F' is the value after standardization, F is the customer's buying frequency during the selected statistical cycle F^L , F^S are the maximum and minimum values respectively for all customers during the selected statistical cycle.

For the monetary value M, the standardization is determined by:

$$M' = \frac{M - M^S}{M^L - M^S} \quad (3)$$

Where M' is the value after standardization, M is the customer's purchasing amount during the statistical cycle, M^L , M^S is the maximum and minimum value for the purchase amount of all customers during the selected statistical cycle. For convenience, in the following content, the standardize results will be represented as R, F, and M.

RESULTS

As previously stated a customer's buying history (RFM) is directly related to future purchases. Determining the weights for the RFM in order to identify the most valued customers is important. Therefore, qualitative analysis of R, F and M is required to understand the relationship between each index.

Firstly, this paper introduces the concept of customer response rate. This response rate is determined as the ratio or proportion of the customer number of a previous given subdivision customers appear in future high-end purchasing customers (customers who have spent a lot of money in the future time) and the customer number of the previous given subdivision consumers. This can be described by the following formula:

$$\text{Response rate} = \frac{A \cap B}{A} \quad (4)$$

Where A is the number of a previous given subdivision customers, B is the number of future high-end customers.

Secondly, in order to verify that the enterprise's weights are suitable for different statistical cycles so a series of cycles are analyzed. Given a particular retail enterprise's sales data for January 1, 2007 to June 30, 2009, 24068 people's purchase history is used for this analysis. A Statistical cycle is defined as a six month period, hence, the selected sales data has 5 statistical cycles.

The first cycle is January 1, 2007 to June 30, 2007, the last cycle is January 1, 2009 to June 30, 2009. For each statistical cycle, the customer's buying situation for the first 5 months of cycle is considered the historical or past subdivision and the last month is considered the current or future division of the cycle for the purposes of establishing a response rate. In the sample the customers are divided in seven subdivisions (1-7, 1 means the lowest buying amount level, and 7 means the highest buying amount level) according to their buying amount (M)'s descending and each group has the same consumer number. Each of these seven subdivisions is further divided into seven more groups based on each group consumers' Frequency (F)'s descending order thus generating a total 49 subdivisions. Customers in the future set (the data in the last month of the cycle and it is also called the test set) will be ordered by their buying amount and are divided into 3 customer groups. Consumers in one consumer group with the largest purchase amount are called the most valuable customers or the high-end consumers. Now the 49 subdivision of customers

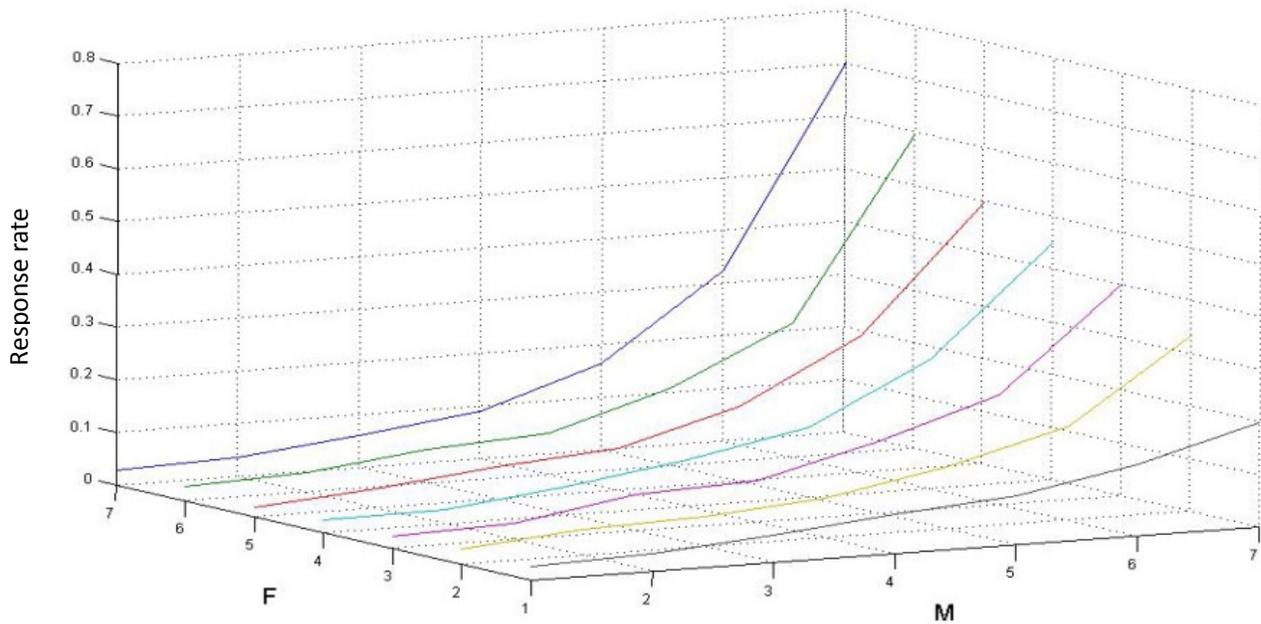


Figure 1. Relationship between response rate and customer's MF level.

is then processed against the test set to obtain a base response rate. The results of these calculations are shown in Figure 1.

In Figure 1, the X axis (M) represents the customers' purchase amount rating and the Y axis (F) represents the customers' frequency level and Z axis represents each segment customer's base response rate. The higher M's level, the greater the customer's purchase amount has been. The greater the F value the more frequently the customer has made purchases. The graph illustrates that frequency and purchase amount obviously have a positive relationship to the customers' future purchase level. When M and F has the highest response rate is the largest, or approximately 0.71. In same way that MF is determined, the MR relationship to the response rate is determined and graphed. The result is depicted in Figure 2.

Figure 2 illustrates the obvious fact that recency (R) and purchase amount (M) have a positive relationship to the customers' future purchase level. When M and R are both maximum, the response rate is the largest, the future purchase probability is the highest. Figure 2 indicates that the best MR's response rate is approximately 0.62.

The results of the analysis of the first statistic cycle indicate the response rate of MF which was found to be 0.71 (Figure 1) is higher than the response rate of MR which was found to be 0.62 (Figure 2). That means the role of F is bigger than the role of R. In the same manner using the first period sales data can be calculated for the relationships between RM and response rate, relationships between RF and response rate. In doing so, it was

found that the RM maximum response rate was 0.77 compared to the maximum response rate for RF that was 0.69. That means the role of M is bigger than the role of F. Therefore, the relationship between R, F and M is better understood. From the first statistical cycle it was determined that the role of M is the biggest, F second, R the least. This same analysis was applied to the remaining four statistical cycles to obtain the results presented in Tables 1 and 2.

Tables 1 and 2 demonstrate that although the response rates for MF and MR differ between statistical cycles, the general rule that for the priorities of M, F and R remain relatively the same: The role of M is the biggest, F second, R the least. More quantitative analysis is required to determine the proper index weights for the enterprise's RFM model.

RFM weight and customer value determination

Based on the above analysis the method for determining the RFM weights based on a given enterprise's sales data is presented in this section.

Since the sum of the three index weights equals 1, the proposed method sets each index weight range from 0.1 - 0.8 in steps of 0.1. Thus a total of 36 combination is formed, such as $R = 0.1, F = 0.2, M = 0.7$, but based on the response rate discussion above regarding the relationship of RFM weight, all combinations which do not satisfy the relationship $M > F > R$ are deleted. Four possible combinations are left.

For each of these possible combinations of weights the

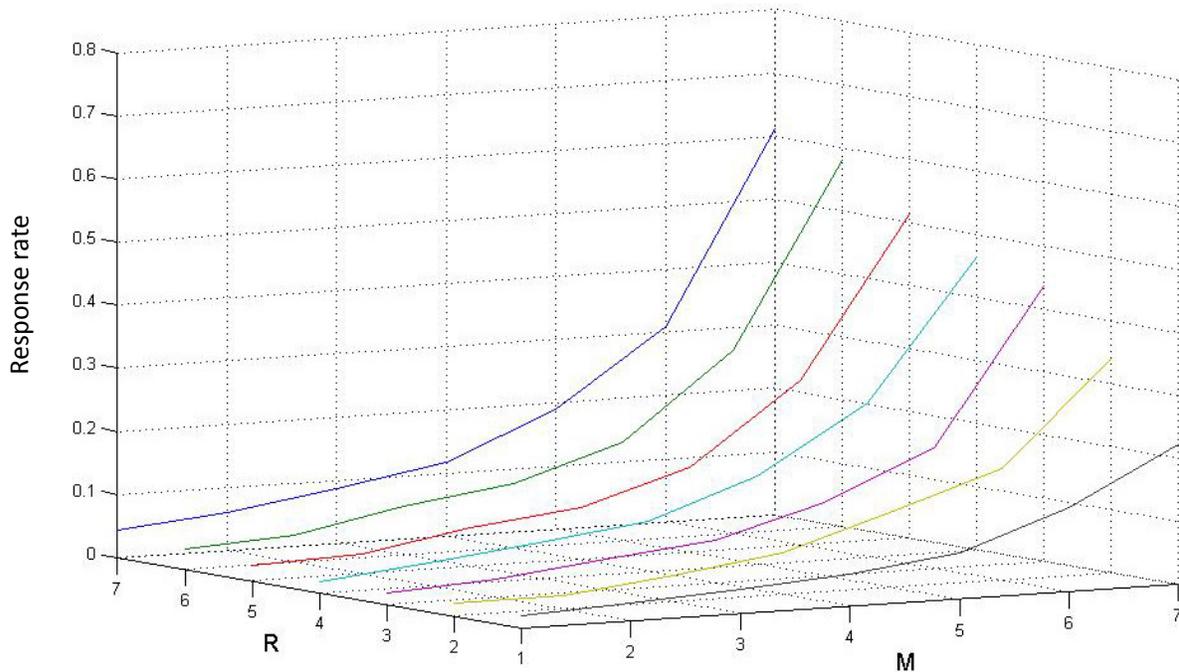


Figure 2. Relationship between response rate and customer's MR level.

Table 1. Maximum MF and MR response rates for all statistical cycles.

Statistical cycles	Maximum MF response rate	Maximum MR response rate
First statistical cycle	0.71	0.62
Second statistical cycle	0.77	0.70
Third statistical cycle	0.94	0.79
Fourth statistical cycle	0.78	0.78
Fifth statistical cycle	0.78	0.72

statistical cycles are again analyzed. For each of the six months of sales data the first five months are considered historical data and the last month is the test data as in the previous analysis. Then using the recency R , frequency F and the monetary M , the weighted value T is determined algebraically as:

$$T = a \times R + b \times F + c \times M \quad (5)$$

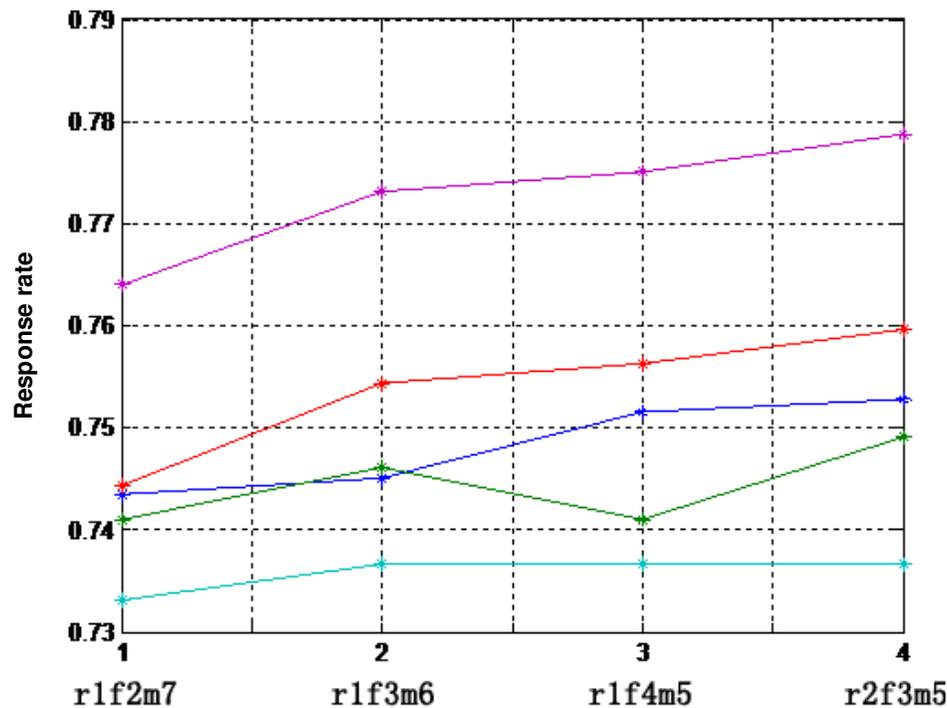
Where a , b , and c are corresponding weights for R , F and M , given a , b and c value, customer value in this five months is obtained corresponding to this weight algebra. For enterprises, they can segment customers according to this weight algebra. In this paper, after calculating customer value, these customer values are arranged in from large T value to small T value and divided customers into 5 groups and each group has the same customer number. At the same time, customers who are in last month of the cycle are arranged in M descending order and divided in three groups. After that this paper

calculates response rate of the largest customer values group compared to the largest purchase amount of the customer group, then changing weights (one of four possible combinations), re-calculating T value and response rate under this new weights in this cycle. In all four combinations of weights, one combination which produces the maximum response rate is the enterprise's best weight for the RFM during this statistical cycle. In order to make this weight combination adapt to different statistical cycle, this method is then applied to the remaining statistical cycles to verify this conclusion.

The above method is applied against the five cycles defined earlier using the SQL Server2005 program to calculate corresponding response rate under four combinations of weight in every cycle, the result is in Figure 3. In Figure 3 the horizontal axis represents the four weight combinations (for example, r1f2m7 means RFM index weights are $a=0.1$, $b=0.2$, $c=0.7$) and the vertical axis represents the corresponding response rate. A different line (color) is used to represent the different

Table 2. Maximum RF and RM response rates for all statistical cycles.

Statistical cycles	Maximum RF response rate	Maximum RM response rate
First statistical cycle	0.69	0.77
Second statistical cycle	0.71	0.77
Third statistical cycle	0.68	0.82
Fourth statistical cycle	0.69	0.77
Fifth statistical cycle	0.63	0.77

**Figure 3.** Response rates according to different weights in different statistical cycles.

statistical cycles (5 statistical cycles).

Figure 3 shows that there is some regularity in each batch but the r2f3m5 weights provides the best or optimum results. Hence this can be regarded as the enterprises RFM index weights. To improve accuracy a 0.01 gradient instead of a 0.1 gradient can be used. The numeric value of the optimum RFM may be different in this case but the principal is still valid.

Conclusion

In this application of the RFM an index weight is determined specifically for the enterprise as the basis evaluating customer value and classifying them according to potential sales. A method to find an enterprise's RFM weight from its sales data reduces or eliminates the subjectivity of the tradition analytic hierarchy process

(AHP) that is biased by the expert's prejudices. Hence, a more credible result is objectively obtained from the enterprise's sales data and this method is not restricted by enterprise characteristics and can be applied to any other enterprises. Based on the objectively determined weights from the enterprise's sales records the customers can be segmented and the most valuable customer set be identified. Hence the overall enterprise management of their customer segment is achieved.

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Full Length Research Paper

Production control systems: Literature review, classification, and insights regarding practical application

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This paper was a review of the literature regarding production control systems (PCS). A classification method based on four categories (order-controlled, stock level-controlled (SLC), flow-scheduled (FS), and hybrid systems) was proposed and used to classify the twenty different systems found in the review. A brief summary of each system was presented, showing the functioning logic and insights with regard to the practical application of each. Some insights arise from this study: (i) the majority of the PCS reviewed are designed for a repetitive, flow shop environment; (ii) the main field of application of all SLC systems is the flow shop, repetitive environment; (iii) in general, the FS systems are more adequate to a non-repetitive environment than are the SLC systems; (iv) hybrid systems constitute a promising field of research regarding the practical application of SCO in job shops and non-repetitive environments.

Key words: Production control systems, production planning and control, literature review, classification, practical application.

INTRODUCTION

According to Burbidge (1990), production control (PC)... is the function of management which plans, directs and controls the material supply and processing activities in an enterprise'. The problem with regard to PC is to determine when and how much to produce in a given manufacturing system in order to satisfy a set of objectives (Liberopoulos and Dallery, 2000). One of the most important activities of PC is what Burbidge (1990) calls ordering. Burbidge defines ordering as the second level of scheduling in production control, which is concerned with regulating the supply of both manufactured parts and bought items, in order to meet the production programme. This activity is performed by production control systems (PCS), which González and Framinam (2009) define as being a set of rules defining order release and material flow control in a manufacturing system. This paper discusses these systems.

PCS are also known as ordering systems (Burbidge,

1990), production control policies (Sharma and Aggrawal, 2009), material planning methods (Jonsson and Mattsson, 2002), production and material flow control mechanism (Fernandes and Carmo-Silva, 2006), logistics control systems (Ghamari, 2009), material flow control mechanism (Graves et al., 1995), production inventory control policy (Gerathy and Heavey, 2004), and production planning and control systems (MacCarthy and Fernandes, 2000). In this paper, it was called systems for coordination of orders (SCO), once it was taken into account that the main contribution of such systems is to coordinate the materials and information flow onto the shop floor. SCO schedule or organise material requirements, and/or control the production and purchasing orders release, and/or schedule jobs on machines. From this point, we refer to such systems as SCO.

The study also highlights certain insights regarding practical applications of SCO. Comparisons and selection between different SCO have been (MacCarthy and Fernandes, 2000) and continue to be (Sharma and Agrawal, 2009; Khojasteh-Ghamari, 2009) an important subject with respect to PPC research. This literature is

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based mainly on analytical (simulation, Markov chain) or conceptual methodology. Despite the existence of considerable research, the problem as to what is the best choice has not yet been solved. According to Gupta and Snyder (2009), the net results of such research are still inconclusive. The goal of this paper is not to provide such an answer but to contribute in this direction, providing insights regarding SCO application, and relating these insights to characteristics of such systems given by the classification proposed.

PROPOSAL OF CLASSIFICATION METHOD FOR THE SCO

The study was conducted on the basis of databases in which twenty SCO were identified. To accomplish the aims of this study, the research is based on the examination of various journals, all of which are related to supply chain management and production planning and control areas. We use journals because we also believe these are the resources most commonly used to acquire information and report new findings (Ngai et al., 2008). Papers were examined across a range of journals using the following electronic databases: (i) Science Direct; (ii) Compendex; and (iii) ABI/ INFORM.

The main goal of the literature review undertaken in this study was to integrate and summarize the state-of-the-art regarding SCO. Therefore, this review is characterized as being of an integrative nature (Neuman, 2003).

After these articles were identified and analysed, a classification method was developed. Some previous SCO classification frameworks are:

- a) WIP-oriented × throughput-oriented production control system: Hopp and Spearman (2008) define a WIP-oriented system as one that defines/controls the WIP level and observes throughput, whereas, a throughput-oriented system defines/controls throughput and observes WIP.
- b) Centralised × decentralised systems: Lodding et al. (2003) define a SCO as centralised if the WIP level (and thereby lead times and work utilisation) are determined on a centralised control level, whereas a decentralised system sets these parameters by means of control loops between manufacturing work centres.
- c) Classification according to the field of application: considerable research attempts to classify SCO according to variables that favourably influence the practical application of SCO. Some variables used include product variety and complexity of material flow (Sipper and Bulfin, 1997; Lodding et al., 2003) and products repetitiveness level (MacCarthy and Fernandes, 2000), among others.
- d) Push × pull systems: according to Bonney et al. (1999), in a push system, the materials and information flow go in the same direction, whereas in a pull system, the materials and information flow go in the opposite

direction. Germes and Riezebos (2010) extend the pull system classification, denominating as unit-based pull systems those that limit the number of orders on the shop floor, whereas load-based pull systems limit the work content (processing time) of orders.

The classification framework developed in this paper arose from Burbidge (1968), who divided SCO into three classes: (i) make-to-order systems; (ii) stock-controlled systems; and (iii) programme-controlled systems. The classification framework proposed is presented further, and is divided into four categories:

- a) Order-controlled systems: There is no stock of final items, once production is carried out according to customers' specifications.
- b) Stock level-controlled systems (SLC): The decision about the release of an order is based only on the stock level, which pulls the production.
- c) Flow-scheduled systems (FS): The release of an order is based on a centralised scheduling drawn up by the PC department. This centralised schedule pushes the production.
- d) Hybrid systems (H): These have characteristics of groups B and C.

SCO CLASSIFICATION

The functioning logic as well as insights regarding the practical application of each of the twenty SCO found in the literature review are presented. The insights serve basically to show production environment characteristics that the SCO literature has demonstrated as being favorable.

Order-controlled system

Contract-scheduling system: This system, based on Burbidge (1968), is used to control orders in the event of complicated products made to special designs. The system basically breaks down single contracts for large complicated projects into a large number of small orders for individual items. The system also sets due dates for the delivery or completion of each item. This work must be done in such a way that the contract is completed within the required finishing date. Therefore, contract-scheduling systems are useful to manage large project systems, which produce high-complexity products. Contract scheduling, unlike most of the other types of SCO, is generally concerned with controlling the production from the stage of initial design through all the stages of production. A number of techniques are used to help schedule the contract; examples are PERT (programme evaluation and review technique) and CPM (critical path method).

Stock level-controlled systems (SLC)

Continuous-review system: The functioning logic of this system – always known as minimal stock system or reorder point system or continuous (Q,R) policy – is to monitor the stock level continuously and to order a fixed quantity when the inventory level reaches a reorder point R.

With regard to practical application, according to Burbidge (1975), a periodic review system can be used to control independent demand items C (result from ABC analysis). Hautaniemi and Pirttilä (1999) agree, adding that the continuous-review system can also be used to control A items when the supplier lead time is long and the demand is low and difficult to forecast (this is supported by Jacobs and Whybark (1992), who claim that if the demand is difficult to forecast, the continuous review system obtains better results than MRP and with less effort). According to Jonsson and Mattsson (2003), this system is useful to control standardised items. A variant of the continuous review system is the cover time planning system (CTP), which, according to Jonsson and Mattsson (2002), is used in Swedish companies.

Periodic-review system: In this system, at fixed intervals – called review period – the inventory level (I) is checked and an order is issued if (I) is below a certain predetermined level. The size of the order is the amount required to bring the inventory to a predetermined level S.

Regarding practical application, according to Burbidge (1975), the periodic-review system can be used to control independent demand items C, especially if items are common and have a low risk of obsolescence. Sipper and Bulfin (1997) recommend combining the periodic-review system (with a review period of typically one or two weeks) with the lot-for-lot strategy for independent demand A items. Examples of papers discussing this system in the literature are Maddah et al. (2004) and Lee and Schwarz (2009).

CONWIP-SLC system: The Conwip system was proposed by Spearman et al. (1990). The total work in process is limited by the number of cards. The functioning logic of this system is the following: an available card has to be present to authorise a job entering the production line. The card is attached to the job that is being routed through workstations. When the processing of the job in the line is completed, the card is removed and made available to authorise another job to enter the line. This characterises the system as being controlled by the stock level (SLC).

Regarding CONWIP-SLC practical application, abundant research suggests this system as being adequate to a flow shop repetitive environment (Huang et al., 1998; Yang, 2000; Krishnamurthy, 2002; Jodlbauer and Huber, 2008). According to Sipper and Bulfin (1997), this system

is useful to control stable and uniform product lines. According to Spearman et al. (1990) and Li (2010), this system allows higher product variety than kanban systems. A recent study showing a practical application of CONWIP-SLC is found in Slomp et al. (2009). A variation of the Conwip system that, according to Stevenson et al. (2005) and Germes and Riezebos (2010), can be used for an environment with higher product variety is denominated 'm-CONWIP'. In this system, there are m (multiple) CONWIP loops for every possible routing on the shop floor.

Kanban- SLC system: In this paper, Kanban- SLC was denoted as kanban variations that follow the logic of pull production from stock without centralised scheduling given by the PPC department. There are different types of kanban, but the two most common are production (P-kanbans) and transportation (T-kanbans). When both are used, the system is called dual-card kanban; when just one type is used, the system is called single-card kanban.

Regarding the field of application, Gelders and Wassenhöve (1985) claim that if the ideal conditions for kanban use are present, it is the ideal system. These conditions are well known in the literature: low set up time, low product variety, and stable demand (White and Prybutok, 2001; Pettersen and Segerstedt, 2009; Lage and Filho, 2010). Therefore, 'Kanban system is not for everybody' (Sipper and Bulfin, 1997). According to MacCarthy and Fernandes (2000), and Gupta and Snyder (2009), the Kanban system is adequate to repetitive, flow shop systems. A literature review dealing with kanban systems is found in Price et al. (1994) and Kumar and Panneerselvam (2007). Many variations of kanban systems are found in the literature: for example, the generalized kanban control system (GKCS) and the extended kanban control system (EKCS). However, Lage and Filho (2010) did a review concerning kanban variations.

TBC (two-boundary control) SLC system: Proposed by Bonvik (1997), the two-boundary control system, TBC (they call it hybrid kanban-CONWIP), combines kanban and CONWIP. The functioning logic of this system is thus: inventory at each of the stages is controlled by kanban cards. The last stage has no kanban control. The first production stage requires two authorisation cards: a kanban card from the second stage and a CONWIP card from the last stage. The CONWIP card has to do with the upper limit of total WIP allowed in the system. By means of this functioning logic, it can be seen that this system can be classified into two categories: it can be considered a system controlled by the stock level (SLC) if the authorisations from both kanban and CONWIP cards are based just on the stock level, or it can be considered a hybrid system if at least one of the card authorisations is based on scheduling from the PPC department. The TBC

system showed good results when compared to other systems (for example, Kanban and CONWIP) in repetitive, flow shop environments (Geraghty et al., 2004; Gaury et al., 2000; Bonvik et al., 1997).

BBC (behaviour-based control) SLC system: The BBC system was proposed by Paternina-Arboleda and Das (2001). In this system, there are three types of authorisation: CONWIP, Kanban, and emergency. The WIP level is controlled as in the CONWIP system. In addition, BBC works with a one-time emergency alert if either the demand is not satisfied or a machine breakdown occurs. Moreover, the intermediate buffers are constrained by means of kanban-type authorisations. According to the way this system is proposed by Paternina-Arboleda and Das (2001), it can be concluded that it is controlled by the stock level (SLC system), once the release of orders (beginning and intermediate points within the production line) is based on stock level and not on a centralised schedule. Paternina-Arboleda and Das (2001) analyse the performance of this system in a flow shop, repetitive environment, obtaining positive results comparing the BBC system with TBC, CONWIP, kanban, and EKCS (extended kanban control system).

Flow-Scheduled Systems (FS)

Base-stock system: The classical reference on base stock is Clark and Scarf (1960). The base-stock system limits the amount of inventory between each production stage and the demand stage.

Each machine tries to keep a certain amount of material in its output buffer, subtracting the backlogged finished goods demand, if any (Bonvik et al., 1997). As it is necessary to transmit information from the PPC department to all production stages in order to authorise production, this system can be characterized as a flow scheduled one.

Regarding applicability, according to Burbidge (1968), the base-stock system is adequate to control repetitive items in a flow shop environment with a stable and non-seasonal demand.

Takahashi and Myreshka (2005), Karaesman and Dallery (2000), and Duenyas et al. (1998) claim this as well. Some of these authors also highlight specific situations where the base-stock system is appropriate: namely, when a higher due date is allowed and when the production rate for all workstations is the same.

PBC (period batch control) system: The PBC system was devised by Mr. R. J. Gigli in approximately 1926. PBC is a cyclical system, operating with a fixed cycle or periods during which the parts are produced that are required in a subsequent period in the next stage (Benders and Riezebos, 2002). Therefore, all the components required to build the products in one period are

scheduled to be built beforehand in the previous stage of production.

Regarding the PBC area of application, according to MacCarthy and Fernandes (2000), this system is appropriate for repetitive and semi-repetitive production systems. Moreover, for PBC implementation, some conditions are required (Burbidge, 1994): product processing time should be less than one period; set-up times should be low, once it is required to work with small lot sizes; and purchasing lead times should be low. One attempt to try to deal with the first and second condition was to use flow shop, cellular manufacturing (Burbidge, 1975). More details regarding this system are found in Burbidge (1975, 1994, 1996) and Steele and Malhotra (1997). It is worth noting that Benders and Riezebos (2002) considered the PBC system to be a classic system, not an outdated one.

MRP system: MRP (material requirements planning) and MRP-II (manufacturing resources planning) are sophisticated SCO that have been used extensively in large companies worldwide since the 1970s. MRP, based on the definition of final products production, enables companies to define when, how many, and what items to produce and purchase (semi-finished products, components, and raw materials). MRP's successor, MRP-II, is a more developed system that takes into account decisions about capacity: namely, it puts into practice the decisions defined by the MRP. MRP-II uses a structured logistics planning that can predict hierarchical calculations, verification procedures, and decisions aimed at reaching viable production planning in terms of material availability and production capacity.

According to a large number of authors (Sipper and Bulfin, 1997), MRP systems can deal with complex situations, such as having a large number of products or products with a Bill of Materials (BOM). Hence, MRP is appropriate for non-repetitive production systems (MacCarthy and Fernandes, 2000). According to Gupta and Snyder (2009), MRP advocates suggest that the flexibility of the system allows it to adapt and to be used together with other SCO. However, MRP users must first overcome a number of problems for the system to work satisfactorily.

These include failure to determine parameters, the MRP infinite capacity approach, and MRP instability, known in the literature as MRP system nervousness (Filho and Fernandes, 2009 gives a more precise definition of system nervousness).

MRP literature is extensive. Examples of topics covered in the literature are: (i) system parameterisation (Hautaniemi and Pirttiä, 1999); (ii) lot sizing procedures (Ho, 2008); (iii) safety stock (Dellaert and Jeunet, 2005); (iv) comparison with other systems (Gupta and Snyder, 2009); (v) uncertainty and risks in the system (Inderfurth, 2009; Barba-Gutiérrez and Adenso-Díaz, 2009); and (vi) finite capacitated MRP (Lee et al., 2009; Kanet and

Stoßlein (2010).

OPT system: The OPT (optimized production technology) system was developed in Israel during the early 1970s by Eliyahu Goldratt. The OPT system is composed of two fundamental elements: a) a philosophy (expressed by means of the well-known 10 OPT rules (Goldratt and Cox 1986; among others); b) software. According to Sipper and Bulfin (1997), the OPT system is the bottleneck scheduler of the managerial concept known as the Theory of Constraints.

The basic functioning of OPT software is the following: input data are received by the BUILDNET module. After that, the SERVE module calculates a load profile and average utilisation for each resource. Based on this capacity calculation, the SPLIT module divides the network into two areas: critical and noncritical resources. It also allocates time buffers at the appropriate places. Finally, the OPT module, using a good heuristic, generates a realistic Master Production Schedule. OPT parameterization is found in Croci and Pozzetti (2000). As to applicability, according to MacCarthy and Fernandes (2000), the OPT system is useful to control semi-repetitive environments.

Hybrid systems

Hybrid CONWIP: This system is similar to CONWIP-SLC. The difference is that the orders that need to be processed in the production line come from a backlog list. This list is generated from a master production schedule (MPS) coming from a centralised PPC department. The backlog list dictates what goes to the line, and the card decides when, which characterises this system as a hybrid one.

CONWIP H is useful for flow shop, repetitive, and semi-repetitive environments, once –in the same way as m-CONWIP – CONWIP H allows higher product variety than Kanban SLC systems (Sipper and Bulfin, 1997).

According to Framinan et al. (2003), who present a literature review about the CONWIP system, some SCO are identical or similar to CONWIP, such as the C-WIP system (Glasse and Resende, 1988); the long-pull system (Lambrecht and Segart, 1990); the global flexible-line system (So, 1990); and the single-stage kanban system (Spearman, 1992). Therefore, in this study, these systems were considered to be variations of the CONWIP system and thus, outside the scope of this paper.

Hybrid kanban system: In this paper, the hybrid kanban system was denoted to be those kanban variations that, despite pulling the production from stock level, have a master production schedule that drives the production of the last stage. Thus, the last stage is scheduled, and production at the rest of the work centres is pulled by the stock level. Lage and Filho (2010) give information about

more kanban variations. The field of application of the hybrid kanban system is the same as Kanban SLC.

DBR (drum, buffer, rope) system: As well as OPT, the DBR system is based on the theory of constraints philosophy. According to Gonzalez et al. (2010), at the shop-floor level, TOC is usually implemented by means of the DBR production control system. DBR is composed of three elements: drum, buffer, and rope. The lower capacity station, which governs the throughput rate of the entire manufacturing line, is known as the 'drum' (also known as capacity constraint resource - CCR). This resource is scheduled based on the finite capacity of the constraint. The time 'buffer' protects the drum (and shipping) from variations. The input control mechanism is the 'rope', and it is based on the use of the bottleneck.

By means of this functioning logic, it can be seen that the system is hybrid, once the 'buffer' pulls the production using the 'rope', but the drum is scheduled by a PPC centralised department. The literature shows that DBR is appropriate for flow shop, repetitive environments (Miltenburg, 1997; Steele et al., 2005; Chakravorty and Atwater, 2005). Recent references to DBR include Gonzalez et al. (2010), Betterton and Cox III (2009), and Wu and Liu (2008).

A system similar to DBR according to Framinan et al. (2003) (also similar to CONWIP) is the starvation avoidance system. This system is described in Glassey and Resende (1988).

Hybrid TBC system: As shown earlier, the TBC system can also be classified as hybrid if at least one of the authorisation cards (kanban or CONWIP) is based on scheduling from the PPC department. We denominate this system Hybrid TBC. The application area of this system is basically the same as the TBC-SLC system.

Hybrid push/pull (HPP) system: The hybrid push/pull system, proposed by Hodgson and Wang (1991a, b), uses push systems to control some production stages, whereas others are controlled by a pull control strategy. A Markov Decision process is used to calculate the number of units that each stage is capable of producing in a given period. According to Gerathy and Heavey (2004), the optimal HPP policy involves pushing during the first stage and pulling in all subsequent stages. This characteristic of pushing some stages and pulling others gives the system a hybrid nature.

Regarding the field of application, Hodgson and Wang (1991a, b) and Gerathy and Heavey (2004) used HPP to control a flow shop, repetitive environment.

Minimal blocking system: The minimal blocking system, proposed by So and Pinault (1988), has a small difference with respect to the kanban system: if the machine upstream finishes its operation before the machine downstream, and the demand occurs at the

downstream machine in the meantime, the upstream machine can start a new operation. Therefore, as a machine can start its operation as a result of either a requisition from the downstream machine or a schedule from the PPC department, this system presents a hybrid characteristic. The literature demonstrates that minimal blocking is adequate for flow shop, repetitive environments (Mitra and Mitrani, 1990). So and Pinault (1988) also stress that minimal blocking is adequate in situations where it is needed to facilitate machine recovery from failures, and to keep bottlenecks working even if there are failed machines upstream.

DEWIP (decentralised work in process) system: The DEWIP system was initially proposed by Lödding (2001). The basic function of DEWIP is to establish decentralised control loops between the manufacturing work centres. The logic of DEWIP functioning is as follows: before an employee starts to work, he or she requests the go-ahead from the work centre that will be performing that particular order's next operation. The last operation of an order can always be processed. The employee at the downstream work centre decides whether to give the go-ahead, on the basis of a defined WIP limit for that work centre. If the employee gets the go-ahead for an order, he or she begins to work on it. Otherwise, he or she asks for the go-ahead for orders destined for different downstream work centres. All known orders are scheduled by a central PPC department. This functioning logic characterises the system as a hybrid one.

According to Lodding et al. (2003), DEWIP is adequate to control job shop, non-repetitive environments.

LOOR (load-oriented order-release) system: According to Breithaupt et al. (2002), the LOOR system is part of a major concept denominated workload control (WLC). This concept recognises that job shop production inevitably shows queues of orders that compete for the capacity of each work centre. The WLC concept tries to create small and stable queues or, more precisely, low and stable levels of direct load. The direct load of a work centre is defined as the quantity of work resulting from waiting orders together with that of the order being processed. The WLC concept smoothes the flow between the work centres by trying to release the right order at the right time. The complexity of this kind of input control, results from the routing variety in job shops. After the release of an order, other operations may have to be completed before an order can be processed at a certain work centre. Thus, orders that constitute input to the direct load of a work centre may come either directly from release or indirectly from any other work centre. The LOOR system is an approach suggested by Bechte (1980) to smooth these combined inputs to the direct load. Other approaches are found in Hendry and Kingsman (1991) and Oosterman (2000).

LOOR has a centralised WIP control and a load

balancing algorithm (Wiendahl, 1995) based on work centre load limits and on the conversion of order times. The load-balancing algorithm takes into consideration not only the actual load for each work station but also the orders scheduled for the given period. An order is released only if the work centre has load available to process the order. The functioning logic characterises this system as a hybrid one, once the load balancing algorithm, which directs the release of orders at the shop floor, is based on a centralised scheduling drawn up by the PPC department, despite the fact that the release of orders is based on the WIP level.

According to Graves et al. (1995) and Lödding et al. (2003), LOOR is adequate for job shop, non-repetitive environments. References to LOOR include those by Wiendahl et al. (1992) and Zapfel and Missbauer (1993). References to WLC include those by Stevenson and Hendry (2006) and Thurer et al. (2010).

POLCA (paired-cell overlapping loops of cards with authorisation) system: The POLCA system was proposed by Suri (1998). This SCO has been designed in line with quick response manufacturing (QRM) principles. Its objective is to guide the material flow through production systems with a cellular layout. In the POLCA system, the flow of orders through the different cells is controlled through a combination of release authorisations and production control cards known as POLCA cards. The release authorisations are generated using a high level centralised materials requirements planning system (HL/MRP). This functioning logic characterises POLCA as a hybrid system, once release of orders are based on WIP levels (POLCA card) and on scheduling from the PPC department (HL-MRP).

Regarding field of application, according to Suri (1998, 2010) and Krishnamurthy and Suri (2009), POLCA is adequate for high variety or custom-engineered products (non-repetitive). Lödding et al. (2003) suggest POLCA for environments with a high number of variants and complexity of materials flow. Variations of POLCA system are found in Fernandes and Carmo-Silva (2006) and Vandaele et al. (2008). Riezebos (2010) gives an overview of POLCA research, as well as a relevant case study.

Conclusion

This paper presents a literature review of production control systems, referred to in this paper as systems for coordination of orders (SCO). A classification method based on four categories is proposed and used to classify the twenty different systems found in the review. A brief summary of each system is presented, showing the functioning logic. This literature review provides managers with a finite set of SCO, which, according to Gonzalez and Framinan (2009), is the first step in choosing the

Table 1. Summary of insights regarding SCO application.

SCO	Application	References
Order-controlled system		
Contract-scheduling system	(i) Large project systems	Burbidge (1968).
Stock level-controlled system		
Continuous-review system	(i) Independent demand class C items; (ii) Class A items with long supplier lead time, low demand, and an erratic forecast; (iii) standardised items	Burbidge (1975), Hautaniemi and Pirttilä (1999), Jacobs and Whybark (1992), Jonsson and Mattsson (2003, 2002).
Periodic-review system	(i) Independent demand items C, especially if items are common parts and have a low risk of obsolescence; (ii) combination of periodic review system (with a review period of typically one or two weeks) with lot-for-lot strategy for independent demand A items	Burbidge (1975), Sipper and Bulfin (1997), Maddah et al. (2004), Lee and Schwarz (2009).
CONWIP-SLC system	(i) Flow shop, repetitive, and semi-repetitive environment; (ii) allows higher product variety than kanban systems	Spearman et al. (1990), Huang et al. (1998), Yang (2000), Krishnamurthy (2002), and Jodlbauer and Huber (2008), Sipper and Bulfin (1997), Li (2010), Slomp et al. (2009), Stevenson et al. (2005) and Germes and Riezebos (2010).
Kanban-SLC system	(i) Flow shop, repetitive environment; (ii) low set up; (iii) low product variety; (iv) stable demand	Gelders and Wassenhöve (1985), White and Prybutok (2001), Pettersen and Segerstedt (2009), and Lage Jr. and Godinho Filho (2010), Sipper and Bulfin (1997), MacCarthy and Fernandes (2000) and Gupta and Snyder (2009), Price et al. (1994) and Kumar and Panneerselvam (2007),
TBC-SLC system	(i) Flow shop, repetitive environment	Bonvik (1997), Geraghty et al. (2004); Gaury et al. (2000).
BBC-SCL system	(i) Flow shop, repetitive environment	Paternina-Arboleda and Das (2001).
Flow-scheduled system		
Base Stock system	(i) Flow shop, semi-repetitive environment; (ii) stable and non-seasonal demand; (ii) longer due date allowed; (iii) same production rate for all workstations	Clark and Scarf (1960), Bonvik et al. (1997), Burbidge (1968), Takahashi and Myreshka (2005), Karaesman and Dallery (2000), and Duenyas et al. (1998).
PBC system	(i) Flow shop, repetitive, or semi-repetitive environment; (ii) products processing time less than PBC cycle time; (iii) low set-up time; (iv) low purchasing lead times; (v) cellular manufacturing	Benders and Riezebos (2002), MacCarthy and Fernandes (2000), Burbidge (1975, 1994, 1996), Steele and Malhotra (1997)
MRP system	(i) non-repetitive environment	Sipper and Bulfin (1997), MacCarthy and Fernandes (2000), Gupta and Snyder (2009), Filho and Fernandes (2009), Hautaniemi and Pirttilä (1999), Ho (2008), Dellaert and Jeunet (2005), Gupta and Snyder (2009), Inderfurth (2009), Barba-Gutiérrez and Adenso-Díaz (2009), Lee et al. (2009), Kanet and Stoßlein (2010).
OPT system	(ii) semi-repetitive environment	Goldratt and Cox (1986), Sipper and Bulfin (1997), Croci and Pozzetti (2000), MacCarthy and Fernandes (2000)

Table 1 Contd.

Hybrid system		
Hybrid CONWIP system	(i) Flow shop, repetitive, or semi-repetitive environment; (ii) allows higher product variety than Kanban system	Sipper and Bulfin (1997), Framinan et al. (2003), Glassey and Resende (1988), Lambrecht and Segart (1990), So (1990), Spearman (1992).
Hybrid Kanban system	(i) Flow shop, repetitive environment; (ii) low set up; (iii) low product variety; (iv) stable demand	Lage Jr. and Godinho Filho (2010)
DBR system	(i) Flow shop, repetitive environment	Gonzalez et al. (2010), Miltenburg (1997), Steele et al. (2005), Chakravorty and Atwater (2005), Betterton and Cox III (2009), Wu and Liu (2008), Framinan et al. (2003), Glassey and Resende (1988).
Hybrid TBC system	(i) Flow shop, repetitive environment	
Hybrid push/pull system	(i) Flow shop, repetitive environment	Hodgson and Wang (1991a, b), Gerathy and Heavey (2004),
Minimal blocking system	(i) Flow shop, repetitive environment; (ii) high rate of machine failures	So and Pinault (1988), Mitra and Mitrani (1990).
DEWIP system	(i) Job shop, non-repetitive environment	Lödging (2001)
LOOR system	(i) Job shop, non-repetitive environment	Breithaupt et al. (2002), Bechte (1980), Hendry and Kingsman (1991), Oosterman (2000), Wiendahl (1995), Graves et al. (1995), Lödding et al. (2003), Wiendahl et al. (1992), Zapfel and Missbauer (1993), Stevenson and Hendry (2006), Thurer et al. (2010).
POLCA system	(i) Semi-repetitive or non-repetitive environment; (ii) cellular manufacturing	Suri (1998, 2010), Krishnamurthy and Suri (2009), Lödding et al. (2003), Fernandes and Carmo-Silva (2006), Vandaele et al. (2008), Riezebos (2010).

most adequate SCO for a manufacturing system. In addition, this paper also presents general insights regarding the practical application of such systems. Table 1 summarizes these insights.

As can be seen in this table, the present review identified one order-controlled system, six stock level-controlled systems, four flow-scheduled systems, and nine hybrid systems. It can also be seen that the majority of systems are designed and appear to be adequate to more simple environments (flow shop, repetitive environment).

One conclusion that arises regarding the practical application of an SCO system is that the main field of application of all systems controlled by the stock levels (here named SLC systems) is the flow shop, repetitive environment. These systems are pulled by the stock level, and therefore, have difficulty in dealing with an environment characterized by high product variety and

complexity of material flow. This claim is supported by Germes and Riezebos (2010). For these authors, pull systems that are applicable in make-to-order environments (characterized by high product variety and complexity of material flow) are scarce. One explanation is that the pull system requires a minimum level of stock, and this is prohibitive in an environment with high product variety. The exception to this conclusion is the CONWIP-SLC system, which appears to be useful even in an environment with a higher product variety. The possibility of establishing m-CONWIP loops makes this system even more flexible.

Another conclusion is that, on average, the flow-scheduled systems are more adequate to a non-repetitive environment than those controlled by the stock level. Examples of such systems are MRP and OPT. The base-stock and PBC system also appear to allow some

flexibility in dealing with more product variety: less than MRP and OPT, but higher than the majority of the systems controlled by the stock level.

The literature review and classification presented in this paper also demonstrate that hybrid systems constitute a promising field of research regarding the practical application of SCO in job shop, non-repetitive environments. Examples of such systems are DEWIP, LOOR, and POLCA. This claim is supported by Krishnamurthy (2002), who states that systems with hybrid characteristics appear to be more useful in job shop environments than pure pull systems.

It is hoped that the review, the proposed classification method, and the resulting analysis will be a useful resource for anyone interested in SCO research, and will help to stimulate further research in this area. In addition, through a better understanding of SCO functioning and application – the core of production control activity – this paper intends to contribute to managers to better understand and choose from among these systems.

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Full Length Research Paper

Performance comparison of mutual funds in Pakistan

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This study was conducted to analyze and compare the performance of different types of mutual funds in Pakistan, and concluded that equity funds outperform income funds. These funds are further classified into broker backed and institutional backed funds for detail analysis. Findings showed that within equity funds, broker backed category shows better performance than institutional funds. On the other hand, among income funds, institutional funds are outperforming broker backed funds. Further, it has been found empirically that fund managers are able to time their investments with the conditions in the market, and possesses significant timing ability. This study further concludes that equity fund managers possess significant market timing ability and institutions funds managers are able to time their investments, but brokers operated funds did not show market timing ability.

Key words: Mutual funds, Pakistan, performance.

INTRODUCTION

Mutual funds today are one of the most studied areas in developed countries due to their efficient and effective role in reducing risk and enhancing return through professional management of funds. These funds boost the incomes of small investors as well as reduce their exposure to unsystematic risks which needs to be taken into consideration for accurate results.

The funds have become extremely popular over the last 20 years. The same funds which were once an obscure instrument are now part of daily lives. In United States, more than 80 million people invest in mutual funds which make a total of trillions of dollars invested in America alone. To many people, investing in mutual funds is just buying and holding them instead of letting cash just stay in bank without any sort of return, and that is the whole understanding of their funds. The returns of the funds are not the true measure of their performance unless risk factors are accounted for in the returns. The investors should look for funds which have highest return with lowest risks to maximize their gain.

Despite the important role funds have played in different countries, the fund industry had not progressed here in Pakistan, irrespective of the fact that first fund NIT

(National Investment Trust) was launched in 1962. All the progress made till date has been the efforts and industry friendly policies that have come during the last five years and if we refer to the statistics, it has been 25 to 30% annual growth, but still, it is growing on a slow pace. As per the mutual fund association of Pakistan (MuFap) there have been 28 asset management companies in the year ending June 30, 2008 and 69 open ended mutual funds. Although this industry has not progressed in Pakistan as it had in other countries, however, growth has been picking the pace in the last few years.

Pakistan's mutual fund industry has taken a giant leap forward over the last decade with the rising number of asset management companies, and size and number of funds. Moreover, this sector now represents a strong presence of well-known financial groups, who bring professional expertise, risk management, large distribution networks and innovative product offerings putting the industry at par with its regional peers.

Investor confidence remains high on the back of superior profitability delivered in an environment of fairness and transparency, through an effective regulatory support and framework designed by the securities and exchange commission of Pakistan (SECP) and the Mutual Fund Association of Pakistan (MUFAP). The future for this industry holds tremendous potential and the regulating authorities are committed to the mission of

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of raising the professional standards of the industry, improving public awareness and advancing the interests of all the stakeholders. The major benefit that this Industry is now capitalizing on is the level of diversification the funds provide. With the level of education and awareness, the individual investors are more concerned to have a secured exposure of various instruments and mutual funds are just doing that.

The analysis in this paper is motivated by the fact that to date, very little evidence on Pakistani mutual fund industry exists. Also, the studies conducted in the past have restricted their analysis only to the very conventional measures of Sharpe Ratio, Treynor Ratio and Jensen's Measure.

The main contribution of this study is to provide a thorough analysis of the mutual fund industry of Pakistan on the dimensions of performance, selectivity, timing, and persistence. The aspects of selectivity, timing, and persistence have never been gauged for the Pakistani mutual industry before. The study concludes that equity funds are better in their performance compared to income funds. However, within equity funds, broker backed category shows better performance and in income funds, institutional funds are outperforming rest of income funds. And it has been found out in our study that fund managers in Pakistan possess significant market timing ability.

LITERATURE REVIEW

Various research papers relevant to our study are discussed. Most of the literature is taken from foreign studies conducted on mutual funds because in Pakistan, not much work has been done on this industry.

Pakistan was the pioneer in the field of mutual funds in the South Asia Region when it launched National Investment Trust (NIT), an open-ended mutual fund in 1962. It was followed by the establishment of Investment Corporation of Pakistan (ICP) in 1966, which launched a series of close-ended mutual funds. Both NIT and ICP were established in the public sector. However, it subsequently failed to maintain the tempo of the initiatives taken in the field until early nineties, mainly due to multiple reasons including frequent changes in economic policies, high rates of alternative investment such as National Saving Schemes (NSS), capital outflow, limited investment options, profusion of risk free investment options in Government securities, lack of awareness among the general public about collective investment schemes, lack of aggressive marketing and distribution network.

The private sector played a major role in attracting investments in mutual funds. The major reason behind this success was the professional management offered by the sector and their attractive marketing techniques. The mutual fund industry grew by an average of 57%

since 2003, which was a remarkable result of the efforts put in by private sector for growth of fund industry of Pakistan. The total size of the industry was 292 billion rupees as at June 30th, 2007. It increased in 2008; however, the total size of industry is 269.221 billion for the first quarter of year 2009. Also, the percentage contribution of various asset management companies (AMCs) towards the total asset under management as in year 2009 has varied. A total of 10 funds have been launched from year 2008 till date, which makes a total of 69 funds at present as against less than 10 funds in 2002 which increased to 32 in 2006, and subsequently to 59 in 2007.

A great number of studies are found on American and European fund industry. The scope of studies is not restricted to evaluating performance with few ratios but a wide research is done on various related topics in funds to have a thorough understanding of the subject.

The Wharton School of Finance and Commerce (1962) carried out the first comprehensive study covering various aspects of the US mutual fund industry. This study was specifically done to evaluate performance of funds. The study found out that half the funds performed better and the other half worse than the unmanaged portfolio.

Sharpe (1966) was acknowledged for his work on performance evaluation. He proved the simple fact that if management is sound but securities are incorrectly selected, there will be major differences in fund returns. Sharpe's (1966) article is among the earliest research to evaluate the performance of mutual funds using some of the concepts from modern portfolio theory. Sharpe posits that if sound mutual fund management requires the selection of incorrectly priced securities, effective diversification and selection of a portfolio in a given risk class, then there is ample room for major and persistent difference in fund returns.

Jensen (1968) developed an absolute measure of performance based upon the capital asset pricing model. The excess returns were regressed upon the excess market returns to estimate the characteristic line of the regression model. Jensen reported that mutual funds did not appear to achieve abnormal performance (in the sense of his risk/return measure) when transaction costs were taken into account. Thus the result of the study lent support, to the strong form of efficient market hypothesis.

Fama (1972) developed a methodology for evaluating investment performance of managed portfolios. Fama suggested that return on a portfolio could be subdivided into two parts; the return for security selection (selectivity) and return for bearing risk (risk). Gupta (1974) found that almost all-mutual fund subgroups outperformed the market when DJIA was used and all, but income and balanced groups, when SandP 500 was used.

Blake and Timmermann (1998) carried out a research on performance evaluation of UK mutual funds and found that the average UK equity fund appears to underperform by around 1.8% per annum on a risk-adjusted basis. Malkiel and Radisich (2001) found that index funds have

regularly produced rates of return exceeding those of active funds by 100 to 200 basis points per annum in the United States over the 1990s, and that there are two reasons for the excess performance by passive funds: management fee and trading costs.

Otten and Bams (2002) carried out a study on European mutual funds. The results suggested that European funds with small capitalization are able to add value. The paper found strong persistence of performance in UK mutual funds, but little or no persistence for countries as France, Germany and Italy. It was also determined that UK funds showed positive Jensen alpha value for returns.

Market timing ability has also been one of the important topics for researchers analyzing the mutual fund industry. For example, Treynor and Mazuy (1966), using a quadratic equation, worked on the hypothesis for no timing ability. They rejected the hypothesis of not possessing timing ability. Lee and Rehman (1990) found that out of 93 US mutual funds, 17% show significant timing ability and 15% show a positive and significant Jensen measure. In fact, 10 funds (11%) have both significant timing and selection abilities. Ferson and Shadt (1996) argue that the true market timing abilities of fund managers, if there are any, should not merely come from publicly available information but also from something that is superior to the lagged public information variables. To address this issue, they propose conditional market timing measures.

The work of Jiang et al. (2004) seems to be the only study that reports the overall significant timing ability in a broad sample of mutual fund managers. Using refined portfolio-based measures derived from the standard Treynor and Mazuy (1966) or Henriksson and Merton (1981) models, they find that US equity funds all have significant timing abilities. They show that, among all the domestic equity funds, the aggressive growth funds are most active in timing the market, followed by growth funds, growth and income funds, with balanced funds as the least active.

The study conducted by Shah and Hijazi (2005) showed that funds industry on average outperform the market proxy by 0.86%. On the whole, the paper suggested that mutual funds in Pakistan are able to add value. Some of the funds however do underperform in the results due to diversification problems.

Sipra (2006) conducted a study on Pakistani fund market. The paper made use of equity funds present in market at that time. Equity funds outperformed the market and produced positive return after deducting costs. The funds also have the potential to add value due to present lack of diversification indicated by the difference in Sharpe and Treynor ratios. The proportion of fund which are able to beat the market in a given time period is low and no fund was able to beat the market consistently, which indicate the semi strong form of market efficiency. The paper made use of Sharpe ratio,

treynor ratio, and Jensen's alpha. The funds outperformed the market on these measures.

In detail, the aim of conducting this particular research followed by the hypotheses that have been developed for this research in order to get to the results is discussed.

AIM OF THE STUDY

The major aim of conducting this study is to explore Pakistani fund industry on which no prior work has been done despite that the foundation of this industry was laid back about 48 years ago in 1962. Yet, with such a long history, no literature is found on Pakistani market except for the two papers that have been written which too have restricted their scope of study to two or three ratios.

Thus this study will be a thorough analysis of performance evaluation and comparison of mutual funds on the dimensions of performance and timing, the aspects which have not been previously looked into for Pakistani industry. Not only the performance will be analyzed and evaluated, but also the study will dig deeper into a particular direction of performance in evaluating the performance of institutional and broker operated funds and making a comparison as to which category of funds perform better and the reasons behind the better performance of the particular category. No author has so far made a comparison of the two categories of funds.

HYPOTHESES DEVELOPMENT

Certain hypotheses have been developed in order to conduct this research. The aim is to proceed for various tests on data sample with the target of getting to a conclusion based on the following hypotheses of this study:

H₁: Equity funds perform better than income funds

This hypothesis is based on the general understanding and literature that with high risks comes high returns, the equity funds are high risk funds being functioning in stock market which is volatile and risky. Whereas, income funds invest in fix income instrument which are a low risk area for investment but returns are low as well. It has been seen that equity funds outperform market proxy (Gupta, 1974; Sipra, 2006).

This hypothesis is further broken down into sub hypothesis for detailed analysis. The two sub hypotheses are:

H_{1a}: Among equity funds broker operated funds perform better than institutional funds.

H_{1b}: Among income funds institutional funds perform better than broker operated funds.

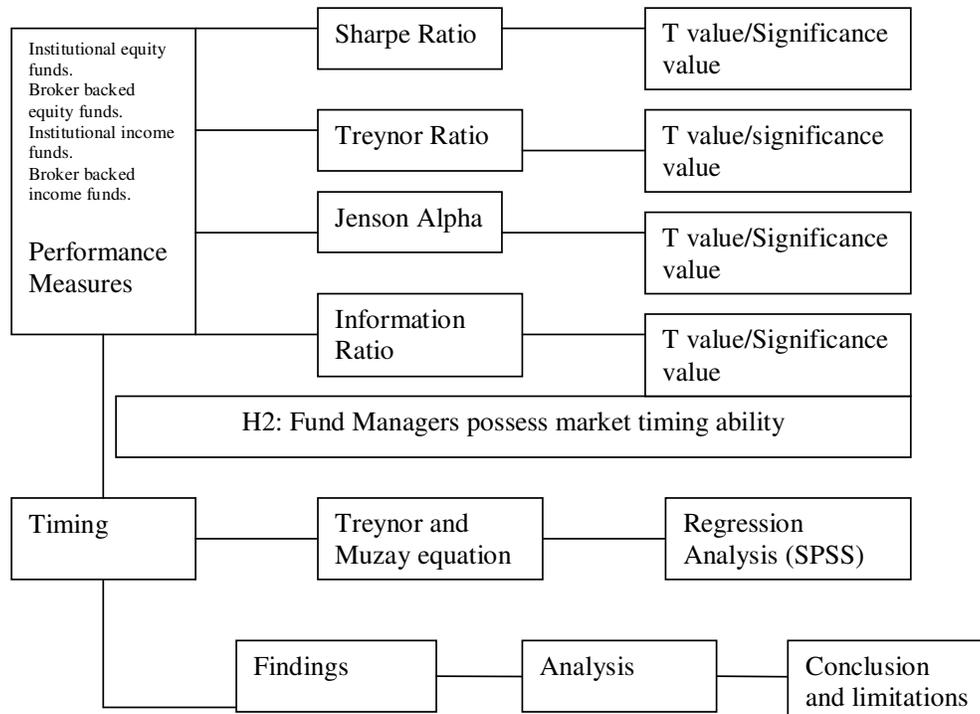


Figure 1. H₁; Equity funds perform better than income funds.

H₂: Fund manager possess market timing ability

This hypothesis has been developed after reading the literature on market timing ability of fund managers (Treynor and Muazey, 1966).

The paper proves that most of the fund managers possess market timing ability (Lee and Rehman, 1990). H₂ has also been divided into sub hypothesis for further investigation.

H_{2a}: Equity fund managers possess timing ability as compared to income fund managers.

H_{2b}: Broker backed funds managers possess market timing ability compared to institutional funds managers.

These two sub hypotheses have been designed to check the timing abilities within the categories of different fund types.

Hypothesis framework

Figure 1 describes the main hypotheses for this study and the stepwise flow of the study once the hypotheses are developed.

RESEARCH DESIGN AND METHODOLOGY

This is an exploratory research and is being conducted for the first time. The hypothesis is developed with intent of getting results that can be useful for further elaboration on this topic, and for an in

depth knowledge. Various tests will be applied to get findings, thus making it a pure quantitative research. This study will be analyzing relationships among large number of variables in single study. Furthermore, it will be a cross sectional study and extent of researcher interference will be minimal.

Variables

The research paper will be covering fund performance from the broker and institutional perspective to get to a conclusion as to which category performs better. Similarly, a detailed analysis will be performed to see if the fund managers in Pakistan possess the market timing ability in our industry.

Independent variables

The independent variables determined for the study are: fund return and credit rating. Funds returns are calculated from their net asset values that are calculated on monthly basis for our research. Further, the credit rating is also an independent variable.

Dependent variables

The dependent variables for the study are: returns of KSE; bond market; fund performance. The returns of KSE-100 index are the dependent variable (Sipra, 2006). Furthermore, fund performance will be a variable depending on fund returns, thus making it a dependent variable.

Sample selection

Sample will be selected based on the ranking of companies as per

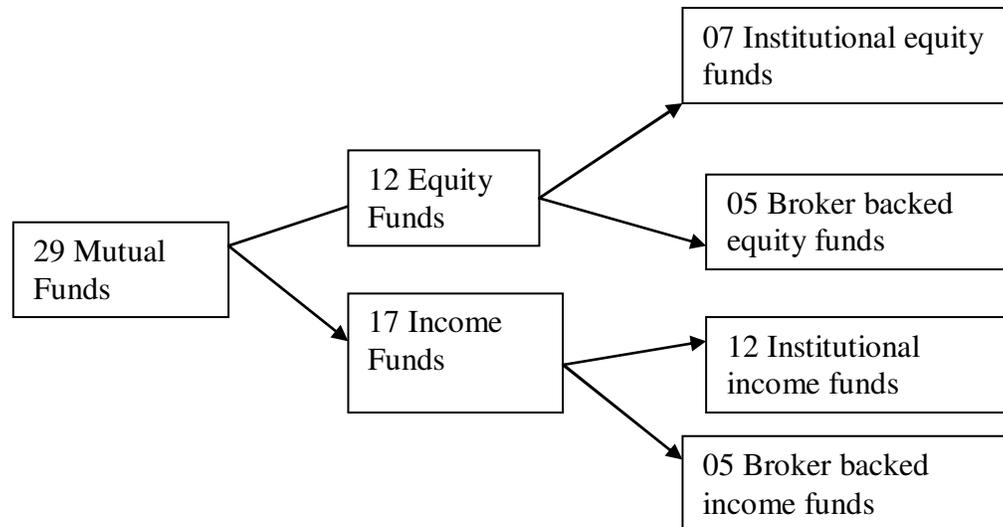


Figure 2. Stepwise flow of the study.

Pakistan Credit Rating Agency (PACRA) ratings.

The order of companies as per PACRA rating is given in All the income and equity funds for the top 15 companies will be taken as per PACRA rating for research purposes that have data available for 3 and more years will be

included in the study in order to get reliable findings.

The entire sample consists of 29 funds. They are further broken down into equity and income funds which are 12 and 17 respectively. Each type of fund is further broken down into two fund categories of institutional and income funds. The step wise flow and number of funds in each broken down type and step are given in the Figure 2.

Time duration

The fund data will be collected for a five year period from year 2005 to 2009. The year will be taken from July till June making the 5th year ending on June 30, 2009. The data will further be collected on per month basis. Because most of the funds do not have a history of more than five years, therefore, a period of five years has been selected for the study.

Sources of data

Data has been gathered from both primary as well as secondary sources that were available. The net asset values (NAV's) which is the value of fund portfolio less liabilities and is calculated on daily basis will be used primarily for calculations.

The values will be taken from the fund sites from their NAV history.

Various other data needed were be taken from various sources including assets management companies of the funds, websites of various funds, state bank's website, and Pakistan credit rating agency (PACRA) website, Securities and Exchange Commission of Pakistan (SECP), concerned individuals, and internet.

Value of risk free rate (R_f) which is the 6 month T-bill rate was taken from state bank website and the remaining values were taken from Jahangir Siddiqui brokerage house JS Global. Market risk rate for equity funds will be calculated based on opening and closing values from KSE-100 index and Karachi Stocks whereas for income

funds, KIBOR rate has been taken from State Bank of Pakistan (SBP).

Performance

There are four models which are used worldwide for the performance evaluation of mutual funds: Sharpe measure; Treynor measure; Jensen differential measure; information ratio.

Sharpe measure

Sharpe (1966) conceived a composite measure to evaluate the performance of mutual funds. This ratio was developed to measure risk-adjusted performance. The Sharpe ratio is calculated by subtracting the risk-free rate which is the 6 month T-bill rate in our study from the rate of return for a portfolio, and dividing the result by the standard deviation of the portfolio returns. The Sharpe ratio formula is:

$$\text{Sharpe ratio} = (R_p - R_f) / \delta P$$

where R_p is the observed average fund return where the average has been calculated through the geometric mean (GM); R_f = the average (calculated through GM) risk free return; δp = the standard deviation of fund returns.

This model is used to measure the performance of a managed portfolio in respect of return per unit of risk. This ratio also measures the portfolio manager's ability on the basis of rate of return performance and diversification by taking into account total risk of the portfolio. The higher the Sharpe ratio, the better the performance. With the help of this measure, one is determining the deviations from the market determined price of risk as defined by capital market line (CML).

Treynor measure

The Treynor measure is similar to the Sharpe ratio in that it is a ratio of excess return per unit of risk except that in this case, the risk is defined as the non-diversifiable risk. In other words, it gives

us the measure of return per unit of market risk or systematic risk that the investment earns.

Thus, Treynor measure is: $(R_p - R_f) / \beta_p$

Where R_p = the observed average fund return where the average has been calculated through the geometric mean (GM); R_f = the average (calculated through GM) risk free return; β_p = the non-diversifiable risk (systematic risk) of the portfolio.

Treynor introduced the concept of the security market line, which defines the relationship between portfolio returns and market rates of returns, whereby the slope of the line measures the relative volatility between the portfolio and the market (as represented by beta). The beta coefficient is simply the volatility measure of a stock, portfolio, or the market itself. The greater the line's slope, the better the risk-return tradeoff.

Jensen's alpha

Jensen's measure, called Jensen's alpha, is the difference of the portfolio return from the return predicted by the CAPM. It is based on the ideas contained in CAPM, and is like Treynor measure, which measures how well a portfolio manager does at dealing with systematic risk. R_m is the return on KSE-100 index, which is the market portfolio in our analysis. The terms within the square brackets equal the expected return for the portfolio being considered according to CAPM.

$$\alpha = R_p - [R_f + \beta(R_m - R_f)]$$

Alpha (α) measures the degree to which managers are earning significant returns after accounting for market risks as measured by beta (β). If the manager is earning a fair return for a given portfolio's systematic risk, then α would be zero. The positive α indicates good performance whereas a negative α indicates a poor performance. Jensen alpha allows us to statistically test whether what the return manager earns is significantly more (or less) than what is expected using the CAPM. The validity of Jensen measure is tied to the validity of CAPM.

Information measure

Information ratio also known as an appraisal ratio, measures a portfolio's average return in excess of benchmark portfolio divided by the standard deviation of this excess return. Formally, the information ratio (IR) is calculated as:

$$IR_j = \frac{\bar{R}_j - \bar{R}_b}{\sigma_{ER}} = \frac{\overline{ER}_j}{\sigma_{ER}}$$

Where: IR_j = the information ratio for portfolio j ; R_j = the average return for portfolio j during the specified time period; R_b = the average return for the benchmark portfolio during the period; σ_{ER} = the standard deviation of the excess return during the period.

To interpret IR, notice that the mean excess return in the numerator represents the investor's ability to use her talent and information to generate a portfolio return that differs from that of the benchmark against which her performance is being measured (for example, the KSE-100 index). Conversely, the denominator measures the amount of residual (unsystematic) risk that the investor incurred in pursuit of those excess returns.

The coefficient σ_{ER} is sometimes called the tracking error of the investor's portfolio and it is the "cost" of active management in the sense that fluctuations in the periodic ER_j values represent random

noise beyond an investor's control that could hurt performance. Thus, the IR can be viewed as a benefit-to-cost ratio that assesses the quality of the investor's information deflated by (1998) has noted that the Sharpe ratio is a special case of the IR where the risk-free asset is the benchmark portfolio, despite the fact that this interpretation violates the spirit of a statistic that should have a value of zero for any passively managed portfolio. More importantly, Goodwin (1998), also showed that if excess portfolio returns are estimated with historical data using the same single-factor regression equation used to compute Jensen's alpha, the IR simplifies to:

$$IR_j = \frac{\alpha_j}{\sigma_e}$$

Where: e = the standard error of the regression.

Timing

Market timing involves shift of funds between a market index portfolio and a safe asset such as treasury bills or a money market fund, depending on whether the market as a whole is expected to outperform the safe asset. In practice however, most managers do not shift fully between t-bills and the market. The formula for determining market timing ability of fund manager is given thus which is also termed as Treynor and Mazuy equation:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + C_p (R_{mt} - R_{ft})^2 + \epsilon$$

Where R_{pt} = Geometric return on the fund; R_{ft} = Geometric mean of risk free return on 6 month t bill; α_p = Jensen alpha of portfolio fund; β_p = Beta of fund; R_{mt} = Market return (GM); ϵ = Error.

If α_p is positive and significantly different from zero, we identify selection skills, as in the security market line model, and if C_p is positive and significant, the mutual fund manager possesses timing ability.

The examples of market timing are switching between sectors, switching between stocks and bonds or switching between stocks and risk free treasury bills. The effect of correctly timing the market would be to increase portfolio beta in up markets (market return exceed risk free return) and decrease it in down markets (market return is less than risk free return).

Tools

The SPSS software and Microsoft excel have been used for calculation of various models to get to proper results. Data analyses tools in Microsoft excel have been frequently used for calculation of beta and regression analysis. Further tests will be run on SPSS to attain final values.

RESULTS

Results that have been achieved by applying various performance measures are focused on. The results are followed by a comprehensive discussion based on these results.

Analysis for H₁

In order to check the significance of findings, various

Table 1. Descriptive statistics for mutual funds 2005 to 2009 (H_1).

Model	Mean	Standard deviation	F	Significance
Sharpe ratio				
Equity funds	0.310	0.144	5.777**	0.023
Income funds	-0.217	0.745		
Treynor ratio				
Equity funds	0.726	0.265	1.336	0.258
Income funds	-0.001	0.110		
Jenson alpha				
Equity funds	1.086	2.055	4.532**	0.043
Income funds	0.304	0.131		
Information ratio				
Equity funds	0.387	0.176	4.336**	0.047
Income funds	0.088	0.473		

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

analyses have been conducted on the entire fund sample. Table 1 gives the descriptive statistics of the entire sample of 29 funds.

The table gives the mean, standard deviations, F statistics and significance level for all the funds ratios. This is done to check the significance of hypothesis one (H_1).

The mean return for Sharpe ratio of equity funds is 0.310 whereas, the mean of income funds came out to be negative (-0.217). The difference is significance at 95% level.

The Treynor measure mean for equity funds is 0.726 whereas, it is negative -0.001 for income funds but these values are not significantly different.

The Jenson alpha mean is 1.086 for equity fund as against the mean of 0.304 for income funds and this difference is significantly different with significance of 0.043 at 95% confidence level.

The information ratio mean for equity funds has come out to be 0.387 whereas for income funds, it is 0.088 which is again, significantly different with value of 0.047 at 95% confidence level.

This table and results thus go in line with the earlier findings that equity funds are doing better than income funds (Gupta, 1974). The reasons for equity funds doing better can be the high risk high return factor. There is high risk in stock market but the returns also are high unlike the income funds in which there is minimal risk factor but the returns then also turn out to be low.

The stock market is characterized by the trade-off between risk and return. The higher the risk the investor is willing and able to take, the higher the potential rewards from the investment. Thus the equity funds perform high.

H_{1a} : Among equity funds, broker backed funds perform better than institutional funds

Table 2 (Panel A) shows the descriptive statistics for the two categories of equity and income funds. Taking the two categories of equity funds and the ratios, the mean for broker backed category in equity funds turns out to be 0.297 whereas, it is slightly higher for institutional funds with the mean of 0.318.

The mean value of Treynor ratio for broker backed equity funds is 0.161 higher than institutional funds mean of 0.009; however, the deviation or risk taken by income funds is higher. Similarly, the mean for broker operated funds category is higher for both the Jenson alpha and information ratio. Thus the broker backed equity funds are performing better than the institutional funds category. The reason for such a result are the dominance the brokers have over stock market and their know how to the market movements. Brokers are directly dealing in stock market and thus know better when it comes to equity funds which are investing in stock market. Institutional funds on the other hand, have not been dealing in stock market instruments so may not be having that strong insight as brokers have.

H_{1b} : Among income funds, institutional funds perform better than broker operated funds

The results in Table 2 (Panel B) are giving the descriptive statistics for income funds categories. Both the broker backed and institutional funds give a negative mean value for Sharpe ratio. The broker category gives mean of -0.236 whereas, institution gives mean of -0.211 which

Table 2. Descriptive statistics for categories of equity and income funds.

Model	Panel A : Equity fund (H _{1a})		Panel B: Income fund (H _{1b})	
	Mean (Std.dev)	F (Sig.)	Mean (Std. dev.)	F (Sig.)
Sharpe ratio				
Broker	0.297 (0.222)	0.58 (0.814)	-0.236 (0.353)	0.003 (0.954)
Institution	0.318 (0.068)		-0.211 (0.842)	
Treynor ratio				
Broker	0.161 (0.207)	0.954 (0.352)	-0.003 (0.155)	0.12 (0.734)
Institution	0.009 (0.298)		-0.001 (0.010)	
Jenson alpha				
Broker	1.918 (3.173)	1.464 (0.254)	-0.220 (0.080)	0.828 (0.377)
Institution	0.492 (0.205)		0.465 (0.142)	
Information ratio				
Broker	0.404 (0.205)	0.075 (0.789)	0.214 (0.423)	0.359 (0.558)
Institution	0.374 (0.169)		0.049 (0.473)	

is not significantly different. Similarly, there is a negative difference for both categories mean in Treynor ratio but it is again not significant.

The Jenson alpha mean for broker category is -0.220 whereas for institution it is 0.465 which is a huge difference while for information ratio both means are positive.

The institutional category of income funds has shown a better mean though not significant. But the means are better in ratios. The reason being income funds invest in fixed income instrument and financial institutional are dealing in that since long time. Their experience and insight in fixed income instrument is more than brokers who have been dealing in equity markets.

Analysis for H₂: Fund managers possesses market timing ability

Market timing refers to a manager's ability to correctly outguess the future market movement and to optimally allocate funds among different asset classes. Security selection, on the other hand, refers to the ability to successfully forecast company specific events and, thus, to pick undervalued securities and outperform passive benchmark portfolios.

Table 3 gives the results for market timing ability of fund managers for entire sample. The timing ability is measured from Treynor and Mazuey equation. Alpha, B ($R_m - R_f$) and $(R_m - R_f)^2$ are independent variables, whereas $R_p - R_f$ is the only dependent variable. The regression analysis has been run in order to get to the results

The entire sample of 29 funds has been taken to check if fund managers in Pakistan possess market timing

ability. We can see that the beta value of $(R_m - R_f)^2$ is 0.116 and is statistically significant with value of 0.003 at a 95% confidence level, thus proving that managers in Pakistani Mutual Funds do show market timing ability and significant security selection ($\alpha = 0.946$).

H_{2a}: Equity fund managers possess timing ability as compared to Income fund managers

Regression analysis has also been run to check if the timing ability is possessed by the equity fund managers or the income fund managers. Table 4 (Panel A) shows the results of regression analysis run for equity funds. The beta value is 0.057 and alpha value is 1.54 which is positive thus proving the timing and security selection ability possessed by equity fund managers.

The results in Table 4 (Panel B) show the regression run for the sample of income fund managers to check the market timing ability.

The value turns out to be -0.082 showing that timing ability is not possessed by managers as the value is negative. It is however not significant.

H_{2b}: Broker funds managers possess market timing ability compared to institutional fund managers

Table 5 (Panel A) is regression for broker operated funds to see market timing ability. It is evident from the table that the managers do not possess market timing ability as the value is negative. This value is however not significant.

Table 3. Regression analysis for timing ability (entire sample) (H_2).

Variable	Beta	t-value	Significant
Constant		-1.107	0.279
Alpha	0.946***	26.981	0.000
B ($R_m - R_f$)	-0.004	-0.116	0.909
Cp ($R_m - R_f$) ²	0.116***	3.271	0.003
R ²	0.972		
F Statistics	286.579		

***p < 0.01.

Table 4. Regression analysis for market timing ability (equity and income fund managers; H_{2a}).

Variable	Panel A: Equity fund managers	Panel B: Income fund managers
	Beta (t-value)	Beta (t-value)
Constant	-0.273 (-1.273)	-0.502(-5.717)
Alpha	1.54*** (5.57)	0.811*** (5.752)
B ($R_m - R_f$)	0.557* (2.016)	-0.161 (-1.14)
Cp ($R_m - R_f$) ²	0.057 (1.362)	-0.082 (-0.612)
R ²	0.986	0.766
F Statistics	191.276***	14.162***

*p < 0.10; **p < 0.05; ***p < 0.01.

Table 5. Regression analysis for market timing ability (broker and institutional fund managers; H_{2b}).

Variable	Panel A: Broker fund managers	Panel B: Institutional fund managers
	Beta (t-value)	Beta (t-value)
Constant	0.498 (0.682)	-0.49 (-0.019)
Alpha	0.992*** (22.582)	0.36*** (3.197)
B ($R_m - R_f$)	-0.032 (-0.584)	-0.036 (-0.506)
Cp ($R_m - R_f$) ²	-0.019 (-0.35)	0.648*** (5.739)
R ²	0.991	0.918
F-Statistics	177.245***	59.961***

*p < 0.10; **p < 0.05; ***p < 0.01.

Table 5 (Panel B) gives the result of regression analysis run on institutional funds. We can see that the value of 0.648 clearly indicates that market timing ability is possessed by the managers and it is significant at the 99% confidence level.

After going through various set of finding, we can say that the fund manager's possess market timing ability taking the entire sample into consideration. However, on individual scales, the equity fund managers possess ability to time their investment where as it was not the case in income funds.

In the categorical findings, the brokers have not been possessing the timing, whereas, institutions have given a high value and at a confidence level of 99%. This means that institutions are major contributors towards the market

timing ability of entire sample. The reason for institutions to possess the market timing is their vast experience and professional management and organized system. Brokers on other hand are relatively new as compared to institutions that have been in operations for years. They have been dominating stock market but the systems are not as organized as institutions that have year's old history, huge networks and professionalism

DISCUSSION

The results of the study which is "performance comparison of mutual funds in Pakistan" are that all the equity funds have been able to beat the market showing

consistent positive results thus performing better than income funds. The higher returns with higher risk can be the main attributer towards a better performance of equity funds on the whole.

The equity and income funds have also been outperforming their benchmark which is consistent with the study of Gupta (1974) who found that almost all-mutual fund subgroups outperformed the market. Also, it is consistent with the study conducted by Shah and Hijazi (2005) showed that funds industry on average outperform the market proxy by 0.86%. On the whole, the paper suggested that mutual funds in Pakistan are able to add value. Some of the funds however do under perform in the results due to diversification problems.

With the categories that are the main subject of our study, the broker operated funds gave a better performance than their institutional equity funds. The brokers have a very in depth knowledge of the movements of stock markets and the lucrative stocks and sectors because this is the core business of stock brokers. Now if they have launched their funds it is equally acceptable fact that their equity knowledge base is more than anyone and thus the equity funds will certainly better off than rest of equity funds categories. Currently, there are four brokers that have been dominating the stock market and thus, are key players when it comes to equities investment decisions. Whereas, it is an equally buyable fact that financial institutions funds will do well in income funds because it is the core business of banks. That is why more number of income funds are found with institution and thus having a high cash position.

The market timing ability has also been area of this study. Regression run on the entire sample of 29 funds show that fund possess market timing ability which is in consistence with the study of Treynor and Mazuy (1966) using a quadratic equation who worked on the hypothesis for no timing ability. They rejected the hypothesis of not possessing timing ability. Thus the study proved that funds possess timing ability and so is proved by our sample results.

The literature available on market timing ability for US and UK market show that funds do possess market timing ability like Lee and Rehman (1990) found that out of 93 US mutual funds, 17% show significant timing ability and 15% show a positive and significant Jensen measure. In fact, 10 funds (11%) have both significant timing and selection abilities. Our findings have come out to be in consistence with the literature available.

Secondly analyzing the equity and income funds for market timing ability, the results proved that equity fund managers possess market timing ability. This result again came in consistence with the studied literature work of Jiang et al. (2004) that reports the overall significant timing ability in a broad sample of mutual fund managers. Using refined portfolio-based measures derived from the standard Treynor and Mazuy (1966), and Henriksson and Merton (1981) models, they found out that US equity

funds all have significant timing abilities. The income fund managers however did not turn out to be showing market timing ability. Similarly, the broker backed sample also did not possess the market timing ability. Institutional funds sample possessed market timing ability and also gave a significant result. This means they are major contributor to the significance that came out in the entire sample studied for timing. Now, one is pushed to think why institutions are showing a significant market timing ability. The answer is very obvious because the financial institutions have been in market for years so they have developed a professional management and organized systems. There is a strong network developed by institutions due to time they have been in market and more professional individuals as fund managers.

The institutions have huge number of funds as against the brokers and it is apparent that they have professionals and resources to manage such a great number of funds. Similarly, people trust with institutional funds is more because of the credibility the institutions have developed with their clients in form of bank dealings and making them more experienced in this field. The entire idea of having market timing ability is to have greater exposure to the market when it is moving up and lower exposure when it is declining. A manager, who consistently increases the fund's exposure to equities just before stock market upturns, will show returns that beat the market. And our fund managers that possess market timing ability just do that.

CONCLUSION AND LIMITATIONS

The study has explored various areas of Pakistani fund industry. The comparison of performance of equity and income funds has been made and equity funds have turned out to be better performing in terms of their returns. These funds can be linked to high risk and high return theory. The broker backed funds perform better in equity fund type whereas institutional funds perform better in income funds. Both of these are based on test results and the fact that brokers main job is dealing in stock market and stocks whereas financial institutions deal in income and money market.

The fund managers in Pakistan possess market timing ability and are able to time their investment decisions with the market movements in order to get best results. They are able to gain greater exposure when the market is moving up and reduce the exposure when it is showing lower trend.

Both equity and income funds possess market timing ability but it is significant in institutions due to their vast experience and dealings. The professional management is also one of the factors of their good performance. Most of the fund managers of income funds are CFA qualified professional managing the fund.

There are certain limitations attached with the study

which if solved, can give a more accurate picture of fund industry of Pakistan. The time period of this research is five years which may not truly represent the performance of funds before this period and affect the results. Newly started funds performance may be over or under estimated due to short span of time.

Lack of data availability was of the major limitation of this paper. Most of the funds in Pakistan do not have a long history, so not much data is available. And in certain cases, data is not being given, which was a barrier. There has not been much work done on mutual fund industry of Pakistan so no tangible research material and findings are present to help in literature survey with reference to Pakistan.

Lack of sufficient benchmarks available to do a more productive research is another major limitation. For example, there is no bench mark present for the style adjusted analysis which can help in an even better analysis. Limited market penetration also limits the scope of research in fund industry and therefore, proves as a hurdle to research on the topic.

Book-to-market ratio is not available for the mutual funds because of which the Fama French Measure cannot be used to gauge performance. This is another important tool for measuring performance and has been used in a number of articles published in the West.

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Full Length Research Paper

Increasing cognitive proximity investments in spatial tourism duopoly

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As distance is often one of the main factors in a tourist's decision to visit a given location, tourism companies often attempt to lower the impact of geographic distance through promotion and related efforts. The focus of this paper is on the business strategy of tourism companies in a competitive market. We examine methods to shorten geographic distance and cognitive distance within a homogenous market consisting of two competing tourism companies. Specifically, we first deal with the question of how to shorten the cognitive distance between a tourism company and its potential tourists' psychological status. We then address the impact of geographic distance on the tourist's choice of travel destination. Through an endogenous business strategy, we discuss the differentiation strategies under the three-stage game process, acquiring a better understanding of the relationship between proximity investment sizes and pricing. The results show that spill-over effect is the decisive factor in a tourism company's investment decision. We also find that non-cooperation is a better strategy for a tourism company in a competitive market.

Key words: Friction of distance, cognitive proximity, three-stage game, spill-over effect.

INTRODUCTION

A primary issue for the management and development of tourism companies is the question of how to attract tourists. From the perspective of business management, investment is important to future enterprise development. Based on this reasoning, we are of the view that tourism companies should establish strategies and objectives to better attract tourists. In this paper, we define the business strategies made by tourism companies as to decide how much differentiation in the features of products compared with their competitors. With taking spill-over effect into account, we deal with the issue of how to increase the cognitive proximity between tourism companies and their potential tourists' psychological status that would exert an influence of reducing the impact of the effect of friction of geographic distance on the tourists' determinants in tourism destination choice.

In contrast with reviews in the fields of spatial economic analyses and leisure/tourism, this paper will modify the tourist's linear cost of transportation according to the effect of friction of distance. It presents the relations between the tourist's utility function and geographic

distance based on the tourist's perception of distance. In this paper, we build a three-stage game context where there exist differences between the two business strategies endorsed by two tourism companies. We consider increasing proximity size by investment effort with a view toward closing the cognitive gap between potential tourists and the tourism companies, thereby improving the sense of distance and engaging value competition. We then seek to contribute to tourism with respect to broadening promotion and investment perspectives as well as tourism companies' efforts to boost the effectiveness of their operating resources.

LITERATURE REVIEW

Cognitive proximity and the demand of tourism

There are many relevant investment approaches worthy of consideration. One major approach to attracting tourists and capitalizing on investments is to minimize the

cognitive gap between tourism companies and their potential tourists and then to increase their interaction. From the tourist's perspective, there exists an inverse relationship between one's willingness to visit a scenic spot and the geographic distance from his location to the destination. Basically, to shorten cognitive distance is to boost the degree of interaction so that there will be more tourists attracted into the tourism destination. With respect to relationship between cognition and tourism demand, Wu (2002) did a research on tourists attending Shovel-mouth-fish festival in the Ali Mountains, Central Taiwan. Wu's findings was that most tourists took a positive view toward this tourist event, Wu's held that to increase proximity would strengthen interaction in a positive manner. Those economic benefits, as Wu argued, included more job opportunity in the tribes, triggering sightseeing enterprises, and greater popularity enjoyed by the tribes. Indeed, with the government's effort to boost the local culture industry in the Ali Mountains by holding these eventful activities, the Taiwanese people have the opportunity to know the tribe deeper and are more willing to visit the tribal areas in the mountains. When the tourists are booming, the benefits as a consequence are shared by the local tourism companies. Liu (2002) when studying the cognition and need of Taiwanese people in playing golf, classified the need of people's having vacation into four elements including multiple amusements, added value service, cosmopolitan tours and professional counseling. After reporting that tourists' purpose of playing golf could be one or several elements combined as mentioned earlier, Liu argued that the higher degree of clienteles' identification of the golf sport, the more importance attached to the need for golf as a leisure sport. This is another positivist case to illustrate a relationship between identification/cognition and leisure need. In this paper, we will combine the cognitive/psychological factor with the geographical/physical factor and carry out a game-theory-based quantitative analysis that seeks to improve our understanding of tourism companies' management strategies and the relationship between investment and pricing.

Cognitive proximity and the spill-over effect of knowledge

In the developing process of economic activities, two groups of people often have interaction with their personnel, materials, information and knowledge, especially if geographic proximity is allowed. This being said, frequency of interaction and its related effects, are subject to geographic distance. In an economic geographic area, co-located economic interests are an issue that cannot be underestimated. If geographic proximity, as a factor, proves insignificant in a detached context, it is argued that we can observe other proximity factors that contribute to communication, coordination and cooperation. Using the other proximity factors, we may

explore the knowledge-based spill-over effect on interaction, learning and initiative processes (Amin and Wilkinson, 1999; Boschma, 2005). Gertler (2003) called the effect of geographic proximity as "De-territorialisation of closeness." Using an umbrella as metaphor, Torre and Gilly (2000) defined the scope of "proximity" by including geography, cognition, organization and institutions.

A review of the literature on the economic utility of proximity shows that neo-classical economists consider knowledge to be a public asset within the economic system. Based on rationality, all actors in the economic system realize that it is impossible to attain an optimal choice with the maximum utilities (Simon, 1955). To reduce uncertainties, firms are often seen to build institutions. Among such institutionalizing efforts, one of the better approaches is to rationally seek closer proximity. These efforts reflect a cumulative, local and silent process to develop initiatives when a firm's unique competitiveness becomes mature. Cohen and Levinthal (1990), however, hold a different view. They believe that low-key effort and uniqueness are not sufficient to be considered valid in constituting knowledge. To transfer valid knowledge, as they argued, we need the ability to absorb and interpret knowledge so that new knowledge can be further developed. To put strategy into practice, Boschma (2005) argued that strengthening cognitive proximity helps interaction but this has to be kept within bounds. Too much cognitive proximity will be detrimental to learning and interaction, increases the likelihood of closure to the outside world and naturally causes a spill-over effect on competitors. We, consequently, need to properly manage the proximity factor without causing further harm.

Under the hypothesis of the externality of knowledge, Audretsch and Feldman (1996) explored the geographic dispersion of economic activities. A further analysis of collected data shows that the geographic amassing of tourism companies is caused by a spill-over effect from research activities such as R and D, academic effort, and related knowledge concerning technical labor. Most of literatures reflect the positive effects of knowledge-based spill-over on developing initiatives and economic growth. However, the question here is whether there are additional kinds of spill-over effects other than those that are knowledge-based. Stel and Nieuwenhuijsen (2004) have elaborated quite expansively on internet-based spill-over effects and marketing-based spill-over effects. To broaden the scope of their case studies, we consider spill-over effects due to cognitive proximity and investment effort. We also believe that our investigation is a worthwhile academic inquiry.

Quantitative models of spill-over effect

It was found that, if a high-tech industry chooses a factory location that is proximate to another, it will boost its contact of talents, manufacturing skills and the R and D

information shared across firms, which, in turn, will increase benefits and decrease costs. Lang (2005) using the New Growth Theory and the Evolution Theory, validated this causal link. Another interesting point that concerns us is the following: how are those spill-over effects integrated into a quantitative analytic model? A review of literature from an economic point of view can be illustrated as described further.

Poyago-Theotoky (1995) observed that high-tech firms, when in an oligopoly, will keep their investment sizes smaller than optimal. In other words, they are not strongly motivated to invest in R and D, as the spill-over effects occur exogenously. From a strategic viewpoint, we ask what the impacts on firms' development strategy are if we control the volume of the spill-over effects. Further research by Piga and Poyago-Theotoky (2004), who took information exchange volumes as a variable and explored the optimal scale of spill-over effects, showed that under non-cooperation conditions, the index of the optimal spill-over effects approached zero as a result of fearing others' free-riding.

Another research done by Piga and Poyago-Theotoky (2005), designed a three-stage game and explored how firms decided the locating place. While admitting quality gap between products, Piga and Poyago-Theotoky argued that in duopoly, competitors would benefit as a result of a firm's proactive effort of improving products' quality, whereas the benefits reaped by the competitors depended on the distance. Piga and Poyago-Theotoky also reported that the volume of R and D investment would rise proportionately with the increase of gap between products' quality. Molto et al. (2005) touched upon decision-making in R and D cooperation using a three-stage game context in duopoly. Compared with those effort devoted to maximum social welfare, these similar acts would also lead to a smaller technical gap. Breton et al. (2004) developed a dynamic and infinite model based upon duopoly differential game to observe the spill-over effects of know-how and skills with a finding that situation like this would lead to quantitatively less products and qualitatively less complementary among the products. Breton et al. therefore, suggested that competition had to be price-oriented as the quantity-oriented competition, they argued, suited for the condition when there are more products in the market and these products are complementary. Firms need to present a positive impression on the potential customers' understanding through efforts to provide information with respect to business content. One possible approach is to strengthen cognitive proximity, thereby initiating a process of pass information, social learning and interaction. Bearing in mind this characteristic factor, we first clarify the need to strengthen interactions between the tourism companies and their potential tourists through proper investment effort. We then address the question of whether the accompanied spill-over effects will hinder the investment motivation and whether or not this will impact tourism companies' overall management strategy.

THE MODEL

To explore how the tourism companies compete in the domestic market, we first integrate the effect of friction of distance as well as tourists' cognition about the features of the products developed by tourism companies and construct a theoretical model concerning the interactions between the two competitors when they make investment and pricing decisions.

Consider a domestic tourism market comprising two tourism companies. Suppose the market is shaped like a line segment from 0 to 1 and that tourists are distributed evenly on it with the density of 1, the tourism companies $i, i \in \{A, B\}$ lie on both ends of the segment, respectively. First of all, we suppose that tourism companies $i, i \in \{A, B\}$ have to create their own business tactics M_i , which could be marked on the line segment $[0,1]$. $\delta = |M_i - M_j|$, $i, j \in \{A, B\}, i \neq j$, represents the degree of featured products differentiation. Based on its business strategy, the tourism company i then determines to invest in increasing the quantity z_i of cognitive proximity between it and its potential tourists. For reasons of convenience, we set the unit investment cost to 1. Then, we follow the assumptions made by Molto et al. (2005). Suppose that the business strategy differentiation between tourism companies is the decision variable. Thus, the spill-over effect will be endogenous. Because of the spill-over effect, the size of the cognitive proximity between tourism company j and its potential tourists increases as a result of the other tourism company's investment effort; that is $x_i = z_i + \alpha(\delta)z_j$. x_i represents the essential quantity of cognitive proximity after taking the spill-over effect into account. Furthermore, we establish a spill-over effect function $\alpha(\delta) = (1 - \delta)s$. $s \in (0,1]$ is the maximum potential influence by the other tourism company's cognitive proximity investment. It implies that the larger the differences between the business tactics made by the two tourism companies, the less the spill-over effects. Besides the decision-making mentioned above, pricing should be considered when the tourism companies compete in the market. Let p_i be the price of tourism company i .

Second, when a tourist travels to a tourism destination, he can obtain the utility $\beta > 0$. Let t be the unit transportation cost. In addition, as stated in Boschma (2005), it is easier to encourage interactions when the cognitive proximity is higher. That means that more tourists are willing to travel to this location, and, of course, it benefits the tourism companies. But too much proximity will induce a lock-in effect which is harmful to interaction. The utility functions are given by:

$$u_A = \beta - p_A - \theta ty^2 + \gamma x_A(1 - x_A) \quad (1)$$

$$u_B = \beta - p_B - \theta t(1 - y)^2 + \gamma x_B(1 - x_B) \tag{2}$$

In this market, there exists a point y_0 such that there is no difference in the value of the utility.

$$y_0 = \frac{1}{2} - \frac{1}{2t\theta}(p_A - p_B + \gamma(x_B(1 - x_B) - x_A(1 - x_A))) \tag{3}$$

Then we construct tourism companys' profit functions as follows:

$$\begin{aligned} \pi_A &= \int_0^{y_0} (p_A - ty) dy - \frac{1}{2} \phi z_A^2 \\ &= \left(\frac{1}{2} - \frac{1}{2t\theta}\right) \left(p_A - \frac{t}{2} \left(\frac{1}{2} - \frac{1}{2t\theta}(p_A - p_B + \gamma(x_B(1 - x_B) - x_A(1 - x_A)))\right)\right) - \frac{1}{2} \phi z_A^2 \end{aligned} \tag{4}$$

$$\begin{aligned} \pi_B &= \int_{y_0}^1 (p_B - t(1 - y)) dy - \frac{1}{2} \phi z_B^2 \\ &= p_B \left(\frac{1}{2} + \frac{1}{2t\theta}(p_A - p_B + \gamma(x_B(1 - x_B) - x_A(1 - x_A)))\right) \end{aligned}$$

$$\hat{p}_A = \frac{2\theta + 1}{2(3\theta + 1)} (\gamma(x_A(1 - x_A) - x_B(1 - x_B)) + t(3\theta + 1)) \tag{6}$$

$$\hat{p}_B = \frac{2\theta + 1}{2(3\theta + 1)} (\gamma(x_B(1 - x_B) - x_A(1 - x_A)) + t(3\theta + 1)) \tag{7}$$

We now turn to the second-stage. Substitution of Equations (6) and (7) into (4) and (5). Then taking the first derivatives of the resulting profit function with respect to z_i , $i = A, B$, and setting them equal to 0, by solving the equations we obtain:

$$z^* = z_i^* = \frac{1}{2(\alpha + 1)} + \frac{2\phi(3\theta + 1)}{\gamma(4\theta\alpha^2 - 4\theta + \alpha^2 - 1)} \tag{8}$$

Substituting Equation (8) into profit functions, we have:

$$\pi_i^* = \frac{t}{8}(4\theta + 1) - \frac{\phi}{2(\alpha + 1)} - \frac{2\phi^2(3\phi + 1)}{\gamma(4\theta\alpha^2 - 4\theta + \alpha^2 - 1)} \tag{9}$$

$$\begin{aligned} &-\frac{t}{2} \left(\frac{7}{4} + \frac{3}{2t\theta}(p_A - p_B + \gamma(x_B(1 - x_B) - x_A(1 - x_A)))\right) \\ &-\left(\frac{1}{2t\theta}(p_A - p_B + \gamma(x_B(1 - x_B) - x_A(1 - x_A)))\right)^2 - \frac{1}{2} \phi z_B^2 \end{aligned} \tag{5}$$

where ϕ_i shows the efficiency of the investment of tourism company i .

NON-COOPERATION GAME

We suppose that the tourism companies have to consider their own future development and make the decisions by themselves, without cooperation with each other. A three-stage game is employed. At the first stage, tourism companies make decisions about business tactics. Then, to shorten the cognitive distance, investments have to be made at the second stage. At the last stage, they proceed to Bertrand-Nash competition. The backward induction method is used. Finally, we obtain the subgame-perfect equilibrium.

We start with the third-stage subgame. First-order condition yields:

$$p^* = p_i^* = \frac{t}{2}(2\theta + 1) \tag{10}$$

Observing Equation (10), the optimal price is not related to the tourism companies' management tactics; rather, it relates positive to the unit transportation cost. This might be caused by the requirement that tourism companies take responsibility for the transportation cost. Interestingly, the optimal price is negatively related to transportation type. Generally, more abominable traffic conditions and higher prices will prevent tourists from traveling to the tourism destination. In our analysis, however, tourism companies intend to raise prices even if the traffic conditions are not convenient for tourists.

To examine the relationship between the optimal investment level and the spill-over effects, we take the derivative of Equation (8) with respect to α :

$$\frac{\partial z^*}{\partial \alpha} = \frac{\gamma(4\theta + 1)}{2(4\theta\gamma\alpha^2 - 6\phi\theta - 4\theta\gamma + \gamma\alpha^2 - \gamma - 2\phi)} * \left(1 - \frac{2\gamma\alpha(4\theta + 1)(\alpha - 1)}{4\theta\gamma\alpha^2 - 6\phi\theta - 4\theta\gamma + \gamma\alpha^2 - \gamma - 2\phi} \right) \quad (11)$$

Suppose

$$\phi > \frac{\gamma(4\theta + 1)(\alpha^2 - 1)}{2(3\theta + 1)} \quad (12)$$

Under the assumption of Equation (12), we obtain $\frac{\partial z^*}{\partial \alpha} < 0$.

Remark 1

The quantity of cognitive proximity investments decreases when the spill-over effect rises.

There often exists a psychology of speculation regarding a free-rider between tourism companies. Therefore, reducing the investment could be the better option to a tourism company since the investment might otherwise benefit its rival. This result coincides with those of Molto et al. (2005) and Poyago-Theotoky (1995). We now run the first stage. Taking a derivative of Equation (9) with respect to δ and setting the resulting function equal to 0, we solve the equation. We obtain:

$$\delta^* = \frac{s - 1}{s} \quad (13)$$

Since $s \in (0,1]$ and Equation (13) should not be negative, we set $s = 1$, i.e. $\delta^* = 0$.

Remark 2

If the effect of the difference between tourism companies' tactics can totally reflect on the spill-over effects that are caused by cognitive proximity investments, under the condition of pursuing maximum profit, tourism companies will reduce the featured products differentiation as much as possible.

COLLUSION BETWEEN TWO COMPETITORS

To pursue the larger profits and avoid price competition, tourism companies will often adopt a means to collude with each other. However, if they collude in price, they might offend the Fair Trade Act in Taiwan. Further, we investigate the case where tourism companies do not cooperate at the first and the second stages but set a uniform price at the third stage of the game. Thus, they exhibit semi-collusion behavior.

Assuming that $\bar{p} = p_A = p_B$ and substitute it into Equation (3), we obtain:

$$\bar{y}_0 = \frac{1}{2} - \frac{1}{2\theta t} (\gamma(x_B(1 - x_B) - x_A(1 - x_A))) \quad (14)$$

Using Equation (14), we develop new tourism companies' profit functions:

$$\bar{\pi}_A = \int_0^{\bar{y}_0} (\bar{p} - ty) dy - \frac{1}{2} \phi z_A^2 \quad (15)$$

$$\bar{\pi}_B = \int_{\bar{y}_0}^1 (\bar{p} - t(1 - y)) dy - \frac{1}{2} \phi z_B^2 \quad (16)$$

As usual, we use the first order condition. We have the investment level:

$$\bar{z}' = z_i = \frac{\gamma(1 - \alpha)(2\bar{p} - t)}{2(2\theta\phi - \gamma + \gamma\alpha^2 + 2\bar{p}\gamma - 2\bar{p}\gamma\alpha^2)} \quad (17)$$

Since investments could not be less than 0 in our model, we suppose $\bar{p} \geq \frac{t}{2}$. The assumption also provides the lower bound on the common price. Taking the first

derivative of Equation (17) with respect to \bar{p} gives:

$$\frac{\partial \bar{z}'}{\partial \bar{p}} = \frac{\gamma(1 - \alpha)}{2\theta t\phi - \gamma + \gamma\alpha^2 + 2\bar{p}\gamma - 2\bar{p}\gamma\alpha^2} * \left(1 - \frac{\gamma(1 - \alpha^2)(2\bar{p} - t)}{2\theta t\phi - \gamma + \gamma\alpha^2 + 2\bar{p}\gamma - 2\bar{p}\gamma\alpha^2} \right) \quad (18)$$

Using the conditions of $\alpha \in [0,1]$ and $\bar{p} \geq \frac{t}{2}$, we find

that $\frac{\partial \bar{z}'}{\partial \bar{p}} > 0$.

Remark 3: The quantity of cognitive proximity investments increases as a function of the common price. Using Equations (8) and (17), we have the optimal common price:

$$\bar{p}^* = \frac{t(2\theta + 1)^2}{2(3\theta + 1)} \quad (19)$$

At the first stage, the optimal difference of tourism companies' business strategy can be found:

$$\delta^* = \frac{s - 1}{s} \tag{20}$$

Obviously, we have $s = 1$, $\delta^* = 0$, $\alpha^* = 1$ and $z^* = z_i^* = 0$. By using the results, we have the optimal profit function:

$$\pi^* = \frac{\varpi}{4} - \frac{t}{8} \tag{21}$$

where $\varpi = \frac{(2\theta + 1)^2 t}{3\theta + 1}$

We compare the optimal prices and profit functions we obtain in previous sections:

$$p^* - p^* = -\frac{t\theta(2\theta + 1)}{2(3\theta + 1)} < 0 \tag{22}$$

$$\pi^* - \pi^* = -\frac{t\theta(2\theta + 1)}{4(3\theta + 1)} < 0 \tag{23}$$

We establish the following.

Remark 4: According to Equations (22) and (23), tourism companies have no inducement to exhibit collusion behavior.

When tourism companies work together to set a common price, this result in a lower price compared to those obtained under competitive market. In the meantime, tourism companies can gain a lower total profit than if they will cooperate with each other.

Therefore, we do not have to worry that the Fair Trade Act will be violated.

CONCLUDING REMARKS

Cognitive distance is the key factor that decides how much interaction can be produced. In the course of development of a tourism destination, a tourism company invests not only on the building facility to meet the leisure need of tourists but also on shortening the cognitive distance between tourists and itself. In this paper, we take tourists' consciousness of geographic distance and cognitive difference into account. Our analysis and deduction have led to the further elaborated results.

Under situations of non-cooperation, because of the spill-over effects, one tourism company can take advantage of another one's investment effort. Thus, there might exist a free-rider condition when making investment decisions. While the tourism company anticipates what actions that its competitor will take, reducing its own investments could be the most probable decision that they

would make. That is, the greater the spillover effects, the fewer investments tourism companies will make. Once we take the spill-over effects by cognitive proximity investment into account, we find that shrinking the differences between tourism companies' business tactics leads to overall gains.

For the sake of avoiding price competition, tourism companies may decide to work together to set a common price. We show that to solicit more tourists, the higher the common prices the stronger the will to invest by tourism companies. However, under such conditions of collusion, both the prices and the gains are less than those obtained if they do not cooperate together. Ultimately, as we show earlier, because of spill-over effects, less differentiation in the features of tourism products will be welcomed by tourism companies in a competitive environment. This result seems to be the counterevidence of the growth of Taiwan tourism industry. Actually, it will be a common outcome if the tourism market is limited within the islands. The finding implies that attracting foreign tourists to visit Taiwan may be the possible way to keep the industry growing.

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Full Length Research Paper

Sectoral analysis of calendar effects in Malaysia: Post financial crisis (1998-2008)

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The Asian financial crisis in 1997 revealed several flaws in financial markets. As a result, various measures were taken to overcome these weaknesses in order to address the efficiency of the financial system where information was more readily available to investors. It is the intention of this paper to investigate whether the stock prices anomalies in the market still persist after the financial crisis. The focus is on Malaysia, a developing nation. The calendar effects which were widely researched were studied for a period of 10 years after the financial crisis in Malaysia. Based on seven sector indices, it was observed that there were significant results in January for month-of-the-year and Monday for day-of-the-week effect. The investigation found that the Malaysian stock market has yet to be fully efficient and investors could still be able to benefit from these anomalies.

Key words:Calendar effects, efficient market.

INTRODUCTION

Over the past three decades, a vast amount of studies have been done to examine the validity of Efficient Market Hypothesis (EMH) and Random Walk Hypothesis (RWH). EMH claims that all available information is always reflected in the share prices efficiently, therefore, there is no opportunity for investors to make abnormal profit or beat the market by exploiting information contained in the history of fundamental data. However, persisting conflicting as well as opposing views on the degree of market efficiency appears. The existence of different beliefs for and against EMH makes this issue interesting area of research in finance economics.

While many believed that markets are mostly efficient, some finance practitioners firmly believe that it is possible to predict the future price by using the historical data (Chung, 2006). In other words, they often assume that stock prices do not follow a random walk and the past behavior of a security's price is rich in information concerning its future behavior - "patterns" of past price behavior will tend to recur in the future. Through the analysis of price charts, one is able to develop an understanding of these "patterns".

There has been a clear divide in acceptance between scholars and practitioners as inefficient markets create stock anomalies, such as day-of-the-week effect, January effect, pre-holiday effect and other anomalies that allowed investors to generate abnormal returns which contradict the EMH and RWH (Kohers and Kohli, 1991).

The primary objective of this study is to examine whether the calendar effects are present in the seven major sectors of Malaysian stock market listed on Bursa Malaysia, namely, construction, consumer products, finance, industrial products, plantation, property, and trading and or services following the aftermath of the Asian Financial Crisis in 1997/1998. This paper investigates the month-of-the-year and day-of-the-week effects for post financial crisis period - from July 1, 1999 to June 30, 2008. The existence of month-of-the-year and day-of-the-week effects would indicate that the market has yet to be efficient even though several safeguards have been introduced by the regulators to make the market more efficient.

This study also examines whether the EMH and RWH still hold true in the seven major sectors of Malaysian stock market after Asian financial crisis. If market is truly efficient, calendar anomalies such as the month-of-the-year and day-of-the-week effects should not exist. This is because the weak form of EMH and RWH state that

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all historical information should be reflected fully in the stock price and past historical data cannot be used to predict future stock price.

Many studies, either from Malaysia or other countries, have found that there are month-of-the-year and day-of-the-week effects in the particular stock markets in the countries examined. If there is an existence of month-of-the-year and day-of-the-week effects in this country, market is proven to be inefficient. Hence, investors may generate abnormal return in the stock market of Malaysia.

LITERATURE REVIEW

Market efficiency postulated by Fama (1965) that share prices always fully reflect all available information and investors will find it impossible to beat the market because the prices are always adjusted to equilibrium. In other words, all unexploited profit opportunities have been eliminated. Market efficiency also has always been associated with Random Walk Hypothesis. The random walk describes the movements of a variable whose future changes cannot be predicted, because the price movement is likely to fall as to rise randomly.

Market inefficiencies create profit opportunities that are attractive to financial practitioners and investors. Thus, investors can make abnormal returns through the buying and selling of these stocks. Two of the best-known calendar anomalies that have defied the efficient market hypothesis and random walk hypothesis are month-of-the-year and day-of-the-week effects.

For the month-of-the-year effect, some researchers found that financial security prices tend to increase in the month of January (Keim, 1983; Jeremy, 1994). This creates an opportunity for investors to buy stocks for lower price before January and sell them after their value increases. Therefore, the trading strategy of making use of the January Effect is an increase in buying securities before the end of the year for a lower price, and selling them in January to generate profit from the price differences.

Cadsby and Ratner (1992) conducted a research on the informational efficiency of security returns through the examination of both turn-of-month and pre-holiday effect on eleven stock markets indices of different countries from the range of year 1962 to 1989 following dummy variable regression. The result showed that the pre-holiday effect was significant for the United States, Canada, Japan, Hong Kong and Australia but not for any of the European countries on stock returns. All countries exhibiting pre-holiday effects do so with reference to local holiday. However,

Hong Kong was the only one country that showed significant U.S. pre-holiday effect which the highest returns in all countries seemed to be earned on day prior to U.S. holidays.

The pre-holiday effect, where stock returns are higher on the day preceding holiday, is one of the most popular in the calendar effect anomalies. Chong et al. (2005) examined the pre-holiday effect in United States, United Kingdom, and Hong Kong stock markets, covering from January 1973 to July 2003 period of time. The results indicated a declining of pre-holiday effects in all three markets and statistically significant in United States until the late 1990s.

For the day-of-the-week effect, many studies have been devoted to the examination of day-of-the-week effect and some researchers observed negative return on Mondays. Cross (1973) observed negative return on Mondays in the US stock market. French (1980) further proved that the returns on Mondays were significantly negative and while the returns on other four days of the week were positive. However, there is existence of other day-of-the-week effects such as Tuesday, Wednesday and Thursday effects in other countries and studies as long as the returns are significantly positive or negative.

Raj and Kumari (2006) investigated the presence of the weekday, day-of-the-week, and weekend effects in the Indian stock market. These effects in Indian market were examined by two major indices: Bombay Stock Exchange Index (BSE) and National Stock Exchange Market (NSE) which covering BSE weekly data for period 1979 to 1998 and daily data for period 1987 to 1998 while NSE data was daily and weekly from 1990 to 1998. The results showed that the negative Monday effect and the positive January effect were not found in India. In fact, Monday's returns were higher than other days. The Monday's returns were positive while Tuesday returns were negative instead. The 14-day settlement period in India used to start on Monday to Friday could be used to explain the positive Monday returns. Thus, Friday low closing prices combined with high opening Monday prices could lead to the positive Monday returns.

Hui (2004) showed the existence of day-of-the-week effect in Asia Pacific markets such as Hong Kong, Korea, Singapore, Taiwan, and Japan. Several stock market indices were used to examine the effect, covering the period from January 1998 to June 2001. The results showed that Hong Kong, Taiwan, and Singapore had a negative mean return on Mondays, while Japan and South Korea reported the highest return on Mondays. Hong Kong's and Singapore's mean returns on Friday were high and significant, only Singapore had a low mean return on Mondays.

Kiyamaz and Berument (2003) investigated the day-of-the-week effect on stock market through using daily major market indices in five countries, including Canada, Germany, Japan, United Kingdom, and United States, covering the period from 1 January 1988 to 28 June 2002. The results showed the occurrence of day-of-the-week effect in both return and volatility equations. The highest volatility of Monday returns occurred in Germany

Table 1. Selected sectors and indices in Malaysian stock market.

Sector	Index
Constructions	KLCON
Consumer Products	KLCSU
Finance	KLFIN
Industrial Products	KLIND
Plantation	KLPLN
Property	KLPRO
Trading/Services	KLSEK

Time period: July 1, 1998 to June 30, 2008
 Number of observations: 2218

and Japan, while Friday in Canada and United States, and Thursday in United Kingdom.

The lowest volatility of returns occurred on Monday in Canada, while Tuesday in Germany, Japan, United Kingdom, and United States. At the same time, the lowest trading volumes occurred on Monday and Friday in Japan, United Kingdom, and United States. The highest trading volume occurred on Tuesday for each market.

However, recent studies conducted by Brusa et al. (2003) found the evidence of reverse weekend effect in the United States and foreign stock markets. They found positive Monday returns in the United States were related to the positive returns on the previous Friday, while the negative Monday returns in foreign markets were related to the negative returns on the previous Friday. This finding is contradictory to the normal trend of the day-of-the-week effect. Therefore, it raises an interesting question for this anomaly and provides an area for future research.

In the past twenty years, a number of studies have been conducted to study the calendar anomalies in the Malaysian stock market. Particularly, Reinganum (1983) investigated January effect (that is, an increase in share price in January) in Malaysian stock market. Wong et al. (1992), on the other hand, investigated the day-of-the-week effect in the Malaysian stock market and reported a negative mean return on Mondays and high positive mean return on Fridays.

The existence of month-of-the-year and day-of-the-week effects suggests that there is a variation in the volatility of stock returns in the stock market. Thus, a number of studies had been conducted to study the volatility of stock return on the month-of-the-year and day-of-the-week effects such as Seow and Wong (1998) and Chia et al. (2006). Seow and Wong (1998) found that the volatility of stock return was declining as the week progressed. This contradicts the principle of higher expected return should be accompanied by higher risk as the researchers found that the low return was accompanied by high risk while high return was accompanied

by low risk. The results imply that investors should sell stocks on Wednesday through Friday when returns are higher and risks are lower.

To test whether the market is efficient, unit root test is applied. If the series of returns is non-stationary (has a unit root, do not reject H_0 , when p-value > 0.1), it implies that the market is efficient as it follows random walk nature. However, if the series of returns is stationary (does not have a unit root, reject H_0 , when p-value < 0.1), it implies that the market is inefficient as it does not follow random walk nature. It also indicates the possibility of the occurrence of calendar effects (Chung, 2006).

The hypotheses of the existence of calendar effects that is month-of-year and day-of-week effect in seven sectors are tested for each sectoral stock index by the OLS and GARCH model.

The hypotheses testing show whether to accept or reject the null hypotheses in this research. The significance of the variables depends on the P-value and confidence interval of 1, 5 and 10%.

METHODOLOGY

For the purpose of this study, we use the seven major sectors indices of Malaysian stock market listed on Bursa Malaysia. These sectors include construction, consumer products, finance, industrial products, plantation, property, and trading/services.

The sampling period for this study covers a period of 10 years, starting from July 1, 1998 to June 30, 2008, for all working weekdays with the exclusion of Saturday and Sunday. If there was a public holiday, then the data used will be based on the day before the public holiday. For example, in the condition where Friday was a public holiday, then Thursday's data will be used to run the test. The data are obtained from Bursa Malaysia, the Malaysia Stock Exchange. The sectors, indices, time period and number of observations are reported in Table 1.

Daily stock returns are calculated by using daily closing sector indices through calculating the differences in the natural logarithms of the indices (Mehdian and Perry, 2001).

$$R_{it} = \log (I_{it}/I_{it-1}) \times 100 \quad (1)$$

Where,

R_{it} = Daily percentage return of stock index i on day t ; I_{it} = Closing value of stock index i on day t and I_{it-1} = Closing value of stock index i on day $t-1$.

In the case of a trading day following a non-trading day, the return is calculated using the closing price index of previous trading day. For example, the Monday daily return of price index is calculated by using the previous closing price index on Friday.

To examine the random walk nature of stock and sector indices, unit root test is applied. Unit root test is designed to discover whether the series is difference-stationary (the null hypothesis) or trend-stationary (the alternative hypothesis). A series with unit root is said to be non-stationary and this is an indication of random walk nature.

Therefore, the stock indices need to be examined to verify the data series is non-stationary and whether it contains a unit root. The method chosen to test the existence of a unit root is Augmented Dickey Fuller (ADF) test. If the series are stationary and have no unit root, the analysis is appropriate and further tests

can be done. The unit root test is based on the following regression:

$$\Delta P = \mu + \gamma P_{t-1} + \sum_{j=1}^q (\rho_j \Delta P_{t-j}) + \varepsilon_t \quad (2)$$

Where Δ represents first differences and P_t is the log of the price index, μ is the constant, γ and ρ are coefficients to be estimated, q is the number of lagged terms, t is the trend and the error term ε_t is assumed to be white noise. The optimal lag length for the ADF is selected with Schwartz Info Criterion (SIC), maximum lag length is set to 12, test for unit root in level and intercepts only in the series (Chung, HY., 2006).

Descriptive statistics are used to provide simple summaries about the sample and the measures.

The measures like mean are used to describe the center of distribution, standard deviation to measure the variation of distribution, Kurtosis to measure "peakedness" of the distribution, skewness to measure the deviation of the distribution from symmetry and Jacque Bera test to determine the probability based on the sample comes from a normally distributed population of observations (Gujarati, 2003).

The linear least squares computational technique provides simple expressions for the estimated parameters in an OLS analysis, and hence for associated statistical values such as the standard errors of the parameters.

Following French (1980), daily dummy variables are created to test for the month-of-the-year and day-of-the-week effects by estimating the following equations.

Month-of-the-year

$$R_{it} = \alpha_{1i}D_1 + \alpha_{2i}D_2 + \alpha_{3i}D_3 + \dots + \alpha_{12i}D_{12} + \varepsilon_t \quad (3)$$

Where,
 R_{it} = Daily stock index return; D_1 - D_{12} = Dummy variables for each month of the year; α_{1i} - α_{12i} = coefficients to be estimated and ε_t = Random error term for month t .

Day-of-the-week

$$R_{it} = \alpha_{1i}D_1 + \alpha_{2i}D_2 + \alpha_{3i}D_3 + \alpha_{4i}D_4 + \alpha_{5i}D_5 + \varepsilon_t \quad (4)$$

where
 day of the week; α_{1i} - α_{5i} = coefficients to be estimated and ε_t = Random error term for day t .

In Equation (3), D_1 is a dummy variable which takes the value of 1 if day t is in January and 0 for all other days of other months (days fall in January = 1; days fall in other months = 0); D_2 is dummy variable which takes the value 1 if day t is in February and 0 for all other days of other months (days fall in February = 1; days

$$h_t = \gamma_1 D_{1t} + \gamma_2 D_{2t} + \gamma_3 D_{3t} + \dots + \gamma_{12} D_{12t} + \sum_{j=1}^p (\beta_j h_{t-j}) + \sum_{j=1}^q (\alpha_j \varepsilon_{t-j}^2)$$

Where
 y_t = Daily yield of stock index; D_{dt} = Dummy variables represent the twelve months of the year. D_{dt} is equal to one if the day t is in R_{it} = Daily stock index return; D_1 - D_5 = Dummy variables for each January ($d = 1$) and otherwise it is zero; δ_j = Coefficients which represent the size and the direction of the effect of each month of the year on stock returns (coefficient $\delta_1, \delta_2, \delta_3, \dots,$ and δ_{12} represent the January effect, February effect, March effect, ... and

fall in other months = 0); The remaining dummy variables are defined in the same manner. The estimated coefficient α_{1i} will be significantly positive for those sector indices that exhibit a traditional January effect (that is, positive return during first month of the year). For example, if there is a positive estimated coefficient in January and significant at 0.1 interval level (that is, p -value < 0.1), it indicates that January effect does exist in that particular sector.

In Equation (4), D_1 is a dummy variable which takes the value 1 if day t is a Monday and 0 for all other days of the week (days fall on Monday = 1; days falls on other days = 0); D_2 is dummy variable which takes the value 1 if day t falls on Tuesday and 0 for all other days of the week (days fall on Tuesday = 1; days fall on other days = 0); The remaining dummy variables are defined in the same manner.

The estimated coefficient α_{1i} will be significantly negative for those sector indices that exhibit a traditional Weekend effect (that is, Monday effect). For example, if there was a negative estimated coefficient on Monday and significant at 0.1 interval level (that is, p -value < 0.1), it indicates that Monday effect does exist in that particular sector.

Subsequently, both Equation (3) and (4) are applied to each sector index using OLS regression.

In this case, the daily dummy variables (0, 1) are defined as an independent variable (x) and the daily return of sector index, as derived from Equation (1), is treated as a dependent variable (y).

Due to limitations of using OLS (Takeshi, 1985), GARCH is applied to further examine the calendar effects. In order to gain more insight into the month-of-the-year and day-of-the-week effects, the GARCH model will be applied to look at the variance of the return on each day more closely. Besides, it also can be expanded to include other relevant variables in the conditional variance equation. Generally, the GARCH model offers more flexibility in robust modelling of stock returns. On the other hand, it also provides a more flexible framework in order to capture various dynamic structures of conditional variance and it allows simultaneous estimation of several parameters of interest and hypothesis (Gregoriou et al., 2004). The GARCH models also take into consideration not only mean return but also the risk or volatility of return.

The GARCH (1.1) model is characterized by two equations which are conditional mean (mean return) and conditional variance (risk or volatility of returns) equations. The GARCH (1.1) models that are applied to study the month-of-the-year and day-of-the-week effects of stock returns and volatility of returns are as follow (Choudhry, 2000):

Month-of-the-year

$$y_t = \delta_1 D_{1t} + \delta_2 D_{2t} + \delta_3 D_{3t} + \dots + \delta_{12} D_{12t} + \varepsilon_t$$

$$\varepsilon_t / \Psi_{t-1} \sim t.d.(0, h_t, v) \quad (5)$$

December effect on stock returns, respectively; ε_t = an error term; h_t = conditional variance and γ_1 = coefficients γ_1 to γ_{12} represent the size and direction of the month-of-the-effect on volatility.

Day-of-the-week

$$y_t = \delta_1 D_{1t} + \delta_2 D_{2t} + \delta_3 D_{3t} + \delta_4 D_{4t} + \delta_5 D_{5t} + \varepsilon_t$$

$$\varepsilon_t / \Psi_{t-1} \sim t.d.(0, h_t, v) \quad (6)$$

Table 2. Descriptive statistics for sector indices returns (1/7/1999 to 30/6/2008).

Sector index	Construction	Consumer products	Finance	Industrial products	Plantation	Property	Trading/ Services
Mean	-0.003769	0.012041	0.00529	0.011414	0.029343	0.002209	0.002846
Median	-0.014886	0.020479	0.01167	0.016574	0.023554	0.005594	0.008902
Std. Dev.	0.690805	0.35001	0.51635	0.427868	0.471885	0.461669	0.498573
Skewness	-0.755364	-0.687487	-0.347278	-0.48471	-0.673666	-0.842183	-0.505674
Kurtosis	13.69554	11.48085	10.74162	13.98103	10.27093	12.59019	11.28596
Jarque-Bera	10782.89	6821.769	5583.362	11230.73	5053.507	8761.911	6439.59
Probability	0	0	0	0	0	0	0
Observations	2218	2218	2218	2218	2218	2218	2218

* All results imply significance at 1% level.

$$r_{it} = \gamma_1 D_{1t} + \gamma_2 D_{2t} + \gamma_3 D_{3t} + \gamma_4 D_{4t} + \gamma_5 D_{5t} + \sum_{j=1}^p (\theta_j h_{t-j}) + \sum_{j=1}^q (\alpha_j \sigma_{t-j}^2)$$

Where,

r_{it} = Daily yield of stock index; D_{dt} = Dummy variables represent the five working days of the week; D_{dt} is equal to one if the day t is a Monday ($d = 1$) and otherwise it is zero; δ_j = Coefficients which represent the size and the direction of the effect of each working day of the week on stock returns (coefficient $\delta_1, \delta_2, \delta_3, \delta_4,$ and δ_5 represent the Monday effect, Tuesday effect, Wednesday effect, Thursday effect and Friday effect on stock returns respectively; ε_t = an error term; h_t = conditional variance and γ_1 = coefficient γ_1 to γ_5 represent the size and direction of the day of the week effect on volatility.

RESULTS AND ANALYSES

The Augmented Dickey-Fuller test strongly rejects the null hypothesis of a unit root for all returns, implying that returns are stationary (do not have unit root). This suggests that the market cannot be regarded as efficient, as the various series of returns do not appear to follow random walk. The result obtained is consistent with studies conducted by Chin (2008), whereby sectors in Malaysian stock markets were weak-form inefficient except the property index. The unit root tests evidenced most of the price indices characterized by mean-reverting process that violated the random walk process.

Table 2 presents the basic statistics of the returns series from the seven sectors of Bursa Malaysia. Based on the means of daily indices returns, the top three best-return sectors are Plantation, Consumer and Industrial Products. However, based on the standard deviations, the top three most-risky sectors are Construction, Finance and Trading/Services. The kurtosis of all sectors investigated shown consistently positive, suggesting that the series are leptokurtic that means all series have a thicker tail and higher peak than a normal distribution. Thus, it is not surprising that all seven returns are found to be non-normal using the Jarque-Bera test. The skewness of daily returns for the seven sectors is found to be negative. This suggests the high

probability of daily returns to be negative in the seven sectors.

Table 3 shows the mean and standard deviation of stock returns for each month of the year of the sectors. All sectors exhibit traditional January effect, that is, positive returns in January and also positive October effect. However, all sectors exhibit negative June and September effect. Generally, the returns are more volatile in January and less volatile in December.

Table 4 shows the mean and standard deviation of stock index returns for each day of the week of the sectors. The mean returns for Monday of all sectors are negative which is similar to other previous studies. The mean returns for Tuesday and Wednesday are all positive. Similarly, most of the series show positive means for Thursday except construction sector. The standard deviation for Monday is the highest for all the sectors. A possible explanation for this large Monday standard deviation is that the Monday closing price reflects the events of three trading days including the weekends (Coutts et al. (2000)). The lower standard deviation is found on Fridays in all sectors except industrial, plantation and trading services.

In general, the market tends to be more volatile at the beginning of the week than at the end of the trading week and less volatile as the weekend approaches. The results obtained for the days which the lowest standard deviation occurs are not consistent through the seven sectors investigated. Out of the seven sectors, four sectors have the lowest standard deviation on Friday. The remaining sectors have the lowest standard deviation on Tuesday.

Such result implies that return seasonality's are not accompanied by any volatility seasonality and investing in low-return weekday does not necessarily mean that risk is also low. In some of the emerging markets, the day on which the lowest (highest) standard deviation occurs is also the day of having the highest (lowest)

Table 3. Descriptive statistics for month-of-the-year sector indices returns.

Sector index	Construction	Consumer products	Finance	Industrial products	Plantation	Property	Trading/ Services
January							
Mean	0.13198	0.039198	0.138088	0.059639	0.023008	0.049246	0.091262
Std. Dev.	0.737627	0.379486	0.549618	0.464584	0.533409	0.458373	0.537733
Jarque-Bera	36.39421	51.88901	48.5014	84.1831	508.6183	77.53657	23.55217
Probability	0	0	0	0	0	0	0.000008
February							
Mean	0.016212	0.035777	0.033713	0.018048	0.094682	0.016895	-0.000493
Std. Dev.	0.658759	0.353646	0.471273	0.379787	0.519344	0.474054	0.421345
Jarque-Bera	163.7696	61.5795	15.03074	42.10113	53.08084	178.3525	38.7676
Probability	0	0	0.000545	0	0	0	0
March							
Mean	-0.035692	0.00768	-0.036431	-0.013777	0.009381	-0.008059	-0.033935
Std. Dev.	0.94698	0.400078	0.572146	0.522092	0.639334	0.555563	0.58226
Jarque-Bera	3882.673	434.7535	551.7921	4698.492	1027.465	880.8664	2367.113
Probability	0	0	0	0	0	0	0
April							
Mean	-0.005565	0.012475	-0.036158	-0.008718	0.0626	0.002472	-0.026259
Std. Dev.	0.539548	0.323457	0.483797	0.444859	0.495023	0.453212	0.557663
Jarque-Bera	1772.747	7129.586	755.9903	1119.901	137.7781	4596.522	1136.042
Probability	0	0	0	0	0	0	0
May							
Mean	-0.025334	-0.006692	-0.025461	0.000729	1.57E-05	-0.037008	-0.034486
Std. Dev.	0.633293	0.288324	0.497858	0.361766	0.404805	0.410617	0.494981
Jarque-Bera	70.4349	3.155997	353.0813	70.98624	73.64256	12.59483	540.549
Probability	0	0.206388	0	0	0	0.001841	0
June							
Mean	-0.066918	-0.017651	-0.022299	-0.033929	-0.002622	-0.020398	-0.025513
Std. Dev.	0.594321	0.30185	0.439685	0.381398	0.424581	0.421859	0.454918
Jarque-Bera	66.71081	109.696	8.393815	47.11684	20.78919	36.14721	59.52724
Probability	0	0	0.015042	0	0.000031	0	0
July							
Mean	0.051094	0.021303	0.046998	0.021493	0.044112	0.045718	0.027937
Std. Dev.	0.71915	0.360284	0.505114	0.430356	0.500376	0.499308	0.483728
Jarque-Bera	149.0275	571.9284	43.53287	314.1333	233.3794	723.9068	105.9483
Probability	0	0	0	0	0	0	0
August							
Mean	-0.018994	0.008832	-0.013731	0.020535	0.015221	-0.033625	-0.017068
Std. Dev.	0.847158	0.466338	0.699796	0.541658	0.43857	0.605625	0.5754
Jarque-Bera	330.9046	770.0102	1142.987	734.2294	195.8083	577.039	705.1449
Probability	0	0	0	0	0	0	0

Table 3. Contd.

September							
Mean	-0.117542	-0.068914	-0.113596	-0.064512	-0.041247	-0.087262	-0.093425
Std. Dev.	0.655089	0.369042	0.583263	0.442158	0.49614	0.494504	0.542738
Jarque-Bera	51.54164	430.6599	243.995	84.53268	285.0755	963.5129	239.0105
Probability	0	0	0	0	0	0	0
October							
Mean	0.066688	0.041521	0.088384	0.062555	0.087628	0.052206	0.075681
Std. Dev.	0.691397	0.310344	0.458846	0.338837	0.401185	0.371298	0.441763
Jarque-Bera	218.625	233.6862	145.2791	48.2563	70.59996	35.9324	110.5358
Probability	0	0	0	0	0	0	0
November							
Mean	-0.005158	0.031783	-0.011257	0.037029	0.033846	0.01537	0.022566
Std. Dev.	0.573903	0.277647	0.420192	0.408872	0.3716	0.333821	0.420145
Jarque-Bera	19.75167	13.73399	29.47222	2245.319	117.2293	7.705458	14.42254
Probability	0.000051	0.001042	0	0	0	0.021222	0.000738
December							
Mean	-0.028607	0.046385	0.024663	0.043072	0.035946	0.036124	0.053339
Std. Dev.	0.522797	0.306406	0.381571	0.338435	0.357694	0.359974	0.382652
Jarque-Bera	54.9829	45.67808	32.76196	13.46322	12.90163	240.289	91.67363
Probability	0	0	0	0.001193	0.001579	0	0

Table 4. Descriptive statistics for day-of-the-week sector indices returns.

Sector index	Construction	Consumer products	Finance	Industrial products	Plantation	Property	Trading/ Services
Monday							
Mean	-0.1382	-0.039182	-0.087854	-0.042959	-0.041512	-0.083873	-0.076294
Std. Dev.	0.881179	0.436674	0.614474	0.514372	0.57448	0.601406	0.589893
Jarque-Bera	4389.163	1955.182	1719.324	4997.586	1640.571	2146.838	2145.008
Probability	0	0	0	0	0	0	0
Tuesday							
Mean	0.038556	0.018281	0.047117	0.023728	0.030461	0.00244	0.023928
Std. Dev.	0.621298	0.314229	0.478206	0.351624	0.420583	0.410265	0.424239
Jarque-Bera	408.9702	405.5432	261.9797	117.2547	1220.606	377.7124	197.7806
Probability	0	0	0	0	0	0	0
Wednesday							
Mean	0.001613	0.005399	0.012829	0.007	0.029395	0.017152	0.023523
Std. Dev.	0.629052	0.335373	0.497582	0.431986	0.460854	0.439646	0.513222
Jarque-Bera	63.55407	96.37137	547.3524	93.36757	426.6524	230.3291	756.6807
Probability	0	0	0	0	0	0	0
Thursday							
Mean	-0.005232	0.015633	0.00065	0.015962	0.054387	0.003206	0.007159
Std. Dev.	0.66454	0.332084	0.493057	0.406435	0.446499	0.427346	0.468845
Jarque-Bera	386.6916	1883.543	1006.172	1378.735	147.2789	1234.641	833.5197
Probability	0	0	0	0	0	0	0

Table 4. Contd.

Friday							
Mean	0.08106	0.058698	0.051533	0.052017	0.072531	0.069511	0.034048
Std. Dev.	0.608456	0.312876	0.477614	0.416043	0.437111	0.390521	0.476343
Jarque-Bera	100.9751	452.7236	790.9506	1804.346	273.8158	407.8421	724.9787
Probability	0	0	0	0	0	0	0

* All results imply significance at 1% level

Table 5. OLS results for month-of-the-year sector indices returns.

Sector index	Construction	Consumer products	Finance	Industrial products	Plantation	Property	Trading/ Services
Jan.	0.13198** (2.552935)	0.039198 (1.496411)	0.138088* (3.58581)	0.059639*** (1.861824)	0.023008 (0.650858)	0.049246 (1.425187)	0.091262** (2.448834)
Feb.	0.016212 (0.29357)	0.035777 (1.278606)	0.033713 (0.819557)	0.018048 (0.527453)	0.094682** (2.507478)	0.016895 (0.45774)	-0.000493 (-0.012394)
March	-0.035692 (-0.718903)	0.00768 (0.305295)	-0.036431 (-0.985075)	-0.013777 (-0.44784)	0.009381 (0.276322)	-0.008059 (-0.24285)	-0.033935 (-0.948176)
April	-0.005565 (-0.110047)	0.012475 (0.486806)	-0.036158 (-0.959809)	-0.008718 (-0.278195)	0.0626*** (1.810231)	0.002472 (0.073118)	-0.026259 (-0.720277)
May	-0.025334 (-0.496886)	-0.006692 (-0.25902)	-0.025461 (-0.670375)	0.000729 (0.023065)	1.57E-05 (0.000449)	-0.037008 (-1.08596)	-0.034486 (-0.938262)
June	-0.066918 (-1.337334)	-0.017651 (-0.696175)	-0.022299 (-0.598254)	-0.033929 (-1.094326)	-0.002622 (-0.076623)	-0.020398 (-0.609882)	-0.025513 (-0.707285)
July	0.051094 (1.037108)	0.021303 (0.853366)	0.046998 (1.280643)	0.021493 (0.704075)	0.044112 (1.309452)	0.045718 (1.388365)	0.027937 (0.786625)
Aug.	-0.018994 (-0.384549)	0.008832 (0.352881)	-0.013731 (-0.373207)	0.020535 (0.67099)	0.015221 (0.450687)	-0.033625 (-1.018513)	-0.017068 (-0.479354)
Sep.	-0.117542** (-2.342871)	-0.068914* (-2.710896)	-0.113596* (-3.039596)	-0.064512** (-2.07525)	-0.041247 (-1.202347)	-0.087262* (-2.602215)	-0.093425* (-2.583174)
Oct	0.066688 (1.343227)	0.041521*** (1.650529)	0.088384 (2.389863)	0.062555** (2.03348)	0.087628* (2.581226)	0.052206 (1.573209)	0.075681** (2.114585)
Nov.	-0.005158 (-0.10005)	0.031783 (1.216736)	-0.011257 (-0.29315)	0.037029 (1.159235)	0.033846 (0.960152)	0.01537 (0.446065)	0.022566 (0.607214)
Dec.	-0.028607 (-0.556447)	0.046385*** (1.780673)	0.024663 (0.644037)	0.043072 (1.352162)	0.035946 (1.022577)	0.036124 (1.051289)	0.053339 (1.43926)

*, **, *** imply significance level at 1, 5 and 10% respectively, t-statistics in parentheses.

return. Therefore, it is safe to capture the profit on high return weekdays as such a high return is obtained at lower risk. Investors should also avoid dealing in the low-return weekday especially Monday in most cases,

as higher risk is incurred and the average reward is relatively low.

Table 5 shows the empirical results for each month of each sector. All seven sectors show a positive

Table 6. OLS results for day-of-the-week sector indices returns.

Sector index	Construction	Consumer products	Finance	Industrial products	Plantation	Property	Trading/ Services
Monday	-0.1382* (-4.202112)	-0.039182** (0.019)	-0.087854* (-3.570405)	-0.042959** (-2.102461)	-0.04151*** (-1.843529)	-0.08387* (-3.81617)	-0.076294* (-3.206447)
Tuesday	0.038556 (1.17901)	0.018281 (0.2708)	0.047117 (1.925773)	0.023728 (1.167891)	0.030461 (1.360473)	0.00244 (0.111667)	0.023928 (1.011357)
Wednesday	0.001613 (0.049774)	0.005399 (0.7428)	0.012829 (0.529061)	0.007 (0.34767)	0.029395 (1.324677)	0.017152 (0.791945)	0.023523 (1.003223)
Thursday	-0.005232 (-0.159253)	0.015633 (0.3485)	0.00065 (0.026463)	0.015962 (0.782115)	0.054387** (2.418044)	0.003206 (0.14606)	0.007159 (0.301228)
Friday	0.08106** (2.503883)	0.058698* (0.0004)	0.051533** (2.127609)	0.052017* (2.586251)	0.072531* (3.272253)	0.069511* (3.212969)	0.034048 (1.453697)

*, **, *** imply significance level at 1, 5 and 10%, respectively, t-statistics in parentheses.

of causing such phenomenon is due to the information released over the weekend tends to be unfavorable. In general, firms fear panic selling when bad news is announced, thus, they may delay coefficient in January; however, only four sectors are statistically significant at 0.01, 0.05, or 0.1 levels. Similar observation was observed in October. However, all sectors show a negative coefficient in September and six sectors are statistically significant at 0.01 and 0.05 levels. This rally is generally attributed to investors buying stocks that have dropped in price following a sell-off at the end of December by investors seeking to create tax losses to sectors. All sectors exhibit a positive coefficient on Friday but only six sectors are statistically significant at 0.01 or 0.05 levels (except Trading/Services). Besides, seven sectors show no evidence of Tuesday, Wednesday, and Thursday effects. The underlying announcement until the weekend, allowing more time for the information to be digested.

While this behavior is certainly possible, it would not cause systematically negative stock returns in an efficient market. Instead, investors would come to expect the release of unfavorable information on weekends and they would sell the stock or discount stock prices appropriately throughout the week. Therefore, the null hypothesis is rejected as the p-value is smaller than the confident interval. It implies that there is day-of-the-week effect in Malaysian stock market across different sectors

The parameter estimates from the GARCH (1.1) conditional variance that investigates the month-of-the-year and day-of-the-week effects on stock return and volatility is shown in Tables 7 and 8. The Bollerslev-Wooldridge robust standard error was computed for all the estimates (Gregoriou et al. (2004)).

This indicates that the series have positive and stationary variance. The ARCH process is significant in all seven sectors as ARCH effects are for up to 1 lag. Hence, the conditional mean and volatility estimates are

offset any capital gains (Chen and Singal, 2004; Jeremy, 1994). The underlying reasons of causing positive October and negative September effects are still unknown.

Therefore, the null hypothesis is rejected as the p-value is smaller than the confident interval. It implies that there is month-of-the-year effect in Malaysian stock market across different sectors.

Table 6 presents the empirical results for each day of each sector. All seven sectors show a negative coefficient and are statically significant at 0.01, 0.05 or 0.1 levels, therefore, Monday effect appears in all reason not misspecified. This indicates that returns for all sectors have to take into account the volatility of stock return.

For month-of-the-year effect, due to the limitation of the calculation, all twelve dummy variables cannot be inserted into the equation of software as variance regressors, thus, December is omitted to avoid singularity problem during estimation.

The p-value is unable to reject the null hypothesis of no serial correlation in the residuals for up to 1 lag at the 5% level significance for all series in the ARCH-LM test. The month-of-the-year effect result demonstrates a significant positive return in certain months.

Table 7 shows most of the sectors exhibit January, July, October, and November effects at 0.01, 0.05, 0.1 significant levels. Positive January effect is statistically significant in Construction, Finance, Industrial Products, and Trading/Services sectors. Positive July effect is statistically significant in Consumer Products, Finance, Industrial Products, and Property sectors. Positive October effect appears in Consumer Products, Finance, Industrial Products, Plantation, and Property sectors while positive November effect appears in Consumer Products, Industrial Products, and Plantation sectors.

Particularly, Consumer Products sector exhibits negative September and positive December effects while Trading/Services sector exhibit positive December

Table 7. GARCH (1.1) results for month-of-the-year sector indices returns.

Sector index	Construction	Consumer products	Finance	Industrial products	Plantation	Property	Trading/Services
Jan.	0.129214* (2.961626)	0.025555 (1.1116)	0.120795* (3.371002)	0.04331*** (1.714097)	0.028815 (1.104098)	0.021899 (0.823295)	0.076065*** (1.936706)
Feb.	0.04557 (0.977701)	0.037889 (1.434376)	0.01261 (0.441345)	0.009849 (0.427839)	0.035679 (0.896998)	-0.005986 (-0.198024)	-0.015756 (-0.553228)
March	-0.011526 (-0.32834)	0.008966 (0.474389)	-0.025761 (-0.956313)	-0.007657 (-0.341736)	0.010243 (0.552311)	-0.009476 (-0.506451)	-0.003095 (-0.117397)
April	-0.014918 (-0.448838)	0.027726 (1.567006)	0.004518 (0.162743)	0.009658 (0.424331)	0.021682 (0.742002)	0.029873 (1.49496)	0.029001 (1.02647)
May	-0.00898 (-0.236844)	0.002293 (0.120734)	-0.018487 (-0.728116)	0.000578 (0.025584)	0.01157 (0.581864)	-0.023189 (-1.020629)	-0.024239 (-1.004036)
June	-0.018692 (-0.534382)	-0.005283 (-0.327096)	-0.009907 (-0.367118)	-0.00375 (-0.176942)	0.013222 (0.510889)	0.002939 (0.128201)	0.006634 (0.294412)
July	0.05246 (1.523292)	0.052462* (2.925051)	0.056906** (2.068004)	0.042319*** (1.939778)	0.035524 (1.260572)	0.049042** (2.202472)	0.034405 (1.438712)
Aug.	-0.003629 (-0.137247)	0.009339 (0.565378)	0.020744 (0.777013)	0.018934 (0.954366)	0.027539 (1.353988)	-0.015144 (-0.776608)	0.007633 (0.336996)
Sep.	-0.024188 (-0.57528)	-0.043629*** (-1.713158)	-0.013466 (-0.497413)	0.00192 (0.09682)	-0.006857 (-0.24823)	-0.014436 (-0.684165)	0.014987 (0.634237)
Oct.	0.034024 (1.239191)	0.038326** (2.328134)	0.040076*** (1.83798)	0.041144** (2.543653)	0.059424* (2.659997)	0.035036** (2.127375)	0.030033 (1.567043)
Nov.	-0.008864 (-0.217021)	0.041385** (2.449288)	-0.005226 (-0.191219)	0.06891** (2.304499)	0.057* (2.643902)	0.026456 (1.396738)	0.016742 (0.784422)
Dec.	-0.043675 (-1.030159)	0.035568*** (1.672019)	0.017069 (0.664418)	0.034025 (1.399055)	0.017136 (0.784061)	0.005742 (0.25748)	0.03623*** (1.877887)

*, **, *** imply significance level at 1, 5 and 10% respectively, z-statistics in parentheses. Results of variance equation are excluded.

Table 8. GARCH (1.1) results for day-of-the-week sector indices returns.

Sector index	Construction	Consumer products	Finance	Industrial products	Plantation	Property	Trading/ Services
Monday	-0.076875* (-2.788524)	0.006126 (0.461686)	-0.022672 (-1.109885)	0.010695 (0.705248)	-0.008327 (-0.430883)	-0.026589*** (-1.742092)	-0.010982 (-0.679682)
Tuesday	-0.003247 (-0.147158)	0.013057 (1.076272)	0.03074 (1.582749)	0.012535** (2.565047)	0.012434 (0.75172)	-0.022772 (-1.616666)	0.009703 (0.625561)
Wed.	-0.005387 (-0.212958)	0.005832 (0.44576)	0.011148 (0.579095)	0.01323 (0.764434)	0.023154 (1.362035)	0.018682 (1.115154)	0.022978 (1.287633)
Thursday	0.014793 (0.559633)	0.011349 (0.710355)	0.010375 (0.549962)	0.016552 (0.940379)	0.029068*** (1.763825)	-0.002449 (-0.138386)	0.018289 (1.022762)
Friday	0.075582* (2.789737)	0.054196* (4.603495)	0.043483** (2.205306)	0.048349* (2.607368)	0.059817* (3.104218)	0.060093* (4.161336)	0.03765** (2.141387)

*, **, *** imply significance level at 1, 5 and 10% respectively, z-statistics in parentheses. Results of variance equation are excluded.

Table 9. Trading strategies applicable for each sector.

Sector index	Construction	Consumer products	Finance	Industrial products	Plantation	Property	Trading/ Services
Jan.	Sell		Sell	Sell			Sell
Jul.		Sell	Sell	Sell		Sell	
Sep.		Buy					
Oct.		Sell	Sell	Sell	Sell	Sell	
Nov.		Sell		Sell	Sell		
Dec.		Sell					Sell
Mon.	Buy					Buy	
Tue.				Sell			
Wed.							
Thu.					Sell		
Fri.	Sell	Sell	Sell	Sell	Sell	Sell	Sell

effect. Other months in the year, including February, March, April, May, June, and August do not show any statistically significant effect by using GARCH(1.1) model. For day-of-the-week effect, all five dummy variables cannot be inserted into the equation of software as variance regressors, thus Wednesday is omitted to avoid singularity problem during estimation (Chandra, 2006; Kiyamaz and Beruments, 2003).

The p-value is unable to reject the null hypothesis of no serial correlation in the residuals for up to 1 lag at the 5% level significance for all series in the ARCH-LM test. The day-of-the-week effect result demonstrates a significant positive Friday return in all sectors. A significant negative Monday effect is found only in construction and property sectors.

From Table 8, Monday effects and Friday effects in the construction and property sectors remain significant in the GARCH (1.1) estimation and this means that they are not due to the varying volatility in the market returns. Moreover, that is surprisingly that the empirical result of Monday effect is inconsistent with the some previous studies that support the existence of day of the week effect (Kok and Wong, 2004; Choudry, 2000). Malaysia shows no evidence of Monday effect when the time-varying volatility in the market returns is taken into account. Besides, Chia et al. (2006) also found no evidence of the presence of the day-of-the-week effect in Malaysia after financial crisis.

Conclusion

The study has shown the existence of the month-of-the-year and day-of-the-week effects in seven sectors of Malaysian stock market as they rejected all null hypotheses. However, when the volatility of the returns is taken into account in the GARCH (1.1) model, some of the effects exist in OLS become insignificant.

All seven sectors in Malaysian stock market are said to be inefficient as they do not follow random walk pattern. The results will help validate the existence of fund managers where it is possible for fund managers to devise a trading rule to exploit those detected anomalies to earn an abnormal rate of return for the clients (Lim et al., 2004). It also helps investors to make better predictions and earn abnormal profits. The use of non-dividend adjusted returns and exclusion of the transaction cost may distort the results, although previous evidence suggests that any such distortion will be extremely small (Coutts et al, 2000; Gregoriou, 2004). Based on the results of GARCH (1.1) model, most of the sectors shows positive January, July, October, and November effects, and positive Friday effect.

The empirical results show that different patterns of month-of-the-year and day-of-the-week effects are revealed in seven sectors of Bursa Malaysia and having useful implications for trading strategies and investment decision. For instance, investors with long-term concern may solely adopt the buy-and-hold strategy in the Malaysian stock market to obtain normal returns. In contrast, to obtain abnormal profit, those active investors may deliberately look for short-run misaligned price due to varying market volatility based on the findings of month-of-the-year and day-of-the-week effects.

Based on the study, investors may increase their expected returns by altering the timing of trades which could include delaying purchases or sales planned for certain months or days (French et al., 1980). General strategies that can be adopted by investors to gain abnormal profits by identifying the buy or sell signal provided from the results of GARCH (1.1) model are shown in Table 9. Those months (or days) which show significantly positive returns do provide a sell signal to investors, that is investors should buy from any other months (or days) and sell on the significantly positive

months (or days) to reap the profit with higher chance. On the other hand, significantly negative months (or days) do provide a buy signal to investors.

Based on the means of daily indices returns, the top three best-return sectors are Plantation, Consumer and Industrial Products. Therefore, if investors are interested to invest in Malaysian stock market, they should primarily consider these three sectors.

However, several reasons may cause an investor not successfully reap profits from exploiting the month-of-the-year and day-of-the-week effects. Firstly, transaction costs might be more than the potential gain and thus making the transaction not profitable especially if it is small. Secondly, there may be reasons external to market such as the timing of public announcement of interest rate changes or publication of profit statements which result in the uncertainty as to whether the month-of-the-year and day-of-the-week effects will materialize.

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Full Length Research Paper

A research on the relation between organizational commitment and learning organization

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This study basically aims to determine the relationship between learning organization and organizational commitment, and to determine whether “emotional commitment”, “normative commitment” and “continuation commitment” which are subordinate elements of organizational commitment have effects on learning organization and subordinate elements of learning organization. Secondary aim is to contribute to the literature by determining which dimension of organizational commitment is more effective on organization. The research was conducted on businesses registered to Aegean Region Chamber of Industry (Izmir/Turkey). The results of the research indicate that organizational commitment is an element which affects learning organization. Moreover, the findings of the research suggest that the information age organizations need to obtain employees with high organizational commitment and take measures in order to increase commitments of employees in order to become learning organizations.

Key words: Organizational learning, organizational commitment, learning organization.

INTRODUCTION

Information created through learning is a strategic input which can help organizations to pacify their competitors and achieve their goal to become one step ahead of them. Organizations in the information age understand that learning means competitive advantage; therefore they determine their primary purpose as becoming effective learning organizations. Organizational commitment which means employees adopting aims, goals and values of the organization and having high faith in these, having a strong will to remain in the organization is a serious issue with respect to effective usage of human element which has become the basic value for organizations. While organizations attempt to become learning organizations on one hand, on the other hand their requirement to create employee commitment appropriate to this makes these two matters attractive. However, number of studies which indicate the relationship between the concepts of becoming learning organization and organizational commitment which have vital importance for information age organizations is quite few.

This study is focused on determining the relationship between learning organization and organizational commitment which is rather missing in the literature.

LITERATURE REVIEW

In the studies performed about learning organization until today, the process of formation of learning organization has been observed and a roadmap for organization leaders was tried to be drawn. Moreover, interaction of learning organization with various variables such as organizational culture, motivation, job satisfaction, performance, personality, employee turnover, individual learning, team learning has been research subjects. Today, leaders have difficulties in transforming their organizations into learning organizations despite all its attraction.

Senge also argues that five disciplines for the prototype learning organization he put forward may not be adequate, in this framework organization leaders have some questions and problems, and these have to be learned and developed in order to establish learning organizations (Senge, 1990). Kofman and Senge, suggest in their studies that without commitment learning cannot be achieved in organizations and transformation towards learning organization cannot be resulted (Kofman and Senge, 1993). Competitive requirements of

information age organizations are more global, more customer-oriented, more flexible, more learning-oriented and more dependent on teamwork. These demands with a tendency to become learning organization require people who combine their emotional, intellectual and physical energy for the success of the organization and have high commitment (Ulrich, 1998). Organizational loyalty which is a concept related to psychological unification and identification of an employee with the organization is the driving power behind organizational success.

Organizational loyalty increases the feeling and interest of the individual to stay within the organization. Information-centered organizations of today when the relations became virtualized have to give importance to organizational loyalty (Iscan and Naktiyok, 2005). Researches indicate that employees with high commitment strive more to fulfill what is expected from them and achieve organizational objectives (Oberholster and Taylor, 1999).

Another consequence of organizational commitment is the fact that it allows diffusion of individual learning into the organization (Lewitt and March, 1998). In a study that was conducted on employee turnover which is a result of organizational commitment, it was concluded that organizations with high employee turnover have slow learning (Carley, 1992; Wasti, 2000).

Therefore, organizational commitment has a function to decrease absenteeism and employee turnover, and this function prevents interruption of the period required for continuous learning.

Information sharing and information sharing culture are musts of learning organizations. Conger and Kanungo find communication important for information sharing since information sharing on organizational mission helps to create a meaning and feeling of purpose, therefore associate it with organizational commitment (Robbins et al., 2002). While Alverson also argues that organizations will be successful in obtaining and producing information to the extent that they maintain high organizational commitment (Alvenson, 2001), Robertsen and O'Malley argue that when more commitment is felt towards the organization, the employees will share their information more with the organization and other employees (Thompson and Heron, 2005).

To sum up; individuals with no commitment or low commitment to organization are more likely to skip work, come to work late or leave work (Meyer and Allen, 1997). Organizational commitment is the primary factor that is critical in achieving organizational objectives (Dick and Metcalfe, 2001) and makes employees problem-solving individuals rather than problem-making (Savery and Syme, 1996). Organizational commitment does not only increase quality and quantity of the level of success of a certain role and contribute to decreasing absenteeism and employee turnover; but also directs the employee to many volunteer behaviors which are required for high

level success in organizational processes (Katz and Kahn, 1977).

METHODOLOGY

Aim of the research

Basic aim of this research is to determine the relationship between learning organization and organizational commitment and differences of organizations with different organizational commitment levels in becoming learning organizations. Subordinate objectives of the research in this respect are; to determine the relationship between learning organization and organizational commitment and to analyze the effect of organizational commitment in general on becoming learning organization.

Hypotheses of the research

H₁: Level of organizational commitment is effective on the level of becoming learning organization.

H_{1a}: Emotional commitment has a positive effect on the level of becoming learning organization.

H_{1b}: Normative commitment has a positive effect on the level of becoming learning organization.

H_{1c}: Continuation commitment has a negative effect on the level of becoming learning organization.

Questionnaire design and sample

Studies of Ford et al. (2000); Goh and Richards (1997); Senge et al. (1998); Armstrong and Foley (2003) were used in developing the learning organization variable consisting of seven dimensions which is the scale of the research conducted on businesses which are members of Aegean Region Chamber of Industry (EBSO). There are many scales used in the literature on organizational commitment. The one developed by Meyer and Allen (1990) is the most widely used and accepted scale. This scale measures organizational commitment in 3 different dimensions as emotional commitment, continuation commitment and normative commitment. This scale by Meyer and Allen was adapted in line with the purpose of the research and was used in measuring the organizational commitment variable of the research.

RESULTS

Validity and reliability analyses of the research were performed. In the factor analyses performed for validity, it has been found that 7-factor structure towards learning organization is appropriate, and in the result of factor analyses towards organizational commitment scale, 3-factor structure is appropriate. When the reliability concerning learning organization scale is examined, Alpha coefficient of the 31-article scale is 0.912, while alpha coefficient of 16-article organizational commitment scale is 0.689. On the other hand, it is observed that organizational commitment scale whose relationship with

Table 1. Relationship of organizational commitment factors with learning organization.

Factor	1	2	3	4	5	6	7	8	9
1. Emotional commitment									
2. Normative commitment	0.610**								
3. Continuation commitment	-0.297**	-0.288**							
4. Flex. Org. structure	0.359**	0.122*	0.021*						
5. Empowerment	0.457**	0.222**	0.338*	0.595**					
6. Individual learning	0.534**	0.205**	0.332**	0.421**	0.525*				
7. Team learning	0.564**	0.115**	0.316**	0.377**	0.563*	0.544**			
8. Organizational learning	0.372**	0.165*	0.361**	0.452**	0.604**	0.364**	0.516**		
9. Shared vision	0.433**	0.131*	0.394*	0.435**	0.573**	0.498**	0.422**	0.632**	
10. System understanding	0.393**	0.178*	0.329**	0.272**	0.476**	0.343**	0.457**	0.599**	0.518**

** p<0.01 and * p<0.05, n=199

Table 2. Influence of organizational commitment factors on learning organization.

Independent variable	Learning organization		
	Beta	t-value	Sig.
Emotional commitment	0.685	90.703	0.000
Normative commitment	0.041	- 0.582	0.561
Continuation commitment	0.269	4.601	0.000

R²=0.406; D.R²=0.397; F=44.367.

the learning organization is tested for the first time is higher than 0.60 alpha coefficients which are accepted for exploratory researches (Hair et al., 1998). Leech et al. (2005) also expressed that low alpha coefficients in scales with few articles are acceptable between 0.60 and 0.69 (Leech et al., 2005). This indicates that scales have internal coherence.

While there is a positive and meaningful relationship between emotional commitment and normative commitment of 99% in the correlation analysis given in Table 1, there is a negative and meaningful relationship between continuity commitment and both emotional and normative commitment in 99%. Learning organization factors have 99% positive and meaningful high level relationship among each other and this relationship is high, therefore, this supports divergence and convergence validities of scales. As it can be observed from Table 1, there is a 1% level of positive and medium level of meaningful relationship between emotional commitment and all learning organization factors. There is a positive but low meaningful relationship between normative commitment and all learning organization factors in the rate of 1 and 5% respectively. It is also observed that continuity commitment has a 5% positive and low meaningful relationship with flexible organizational structure, strengthening and shared vision, while it is only 1%, positive and medium-meaningful for other organizational factors.

Results of regression analysis indicating the influence of organizational commitment factors on learning organization are given in Table 2. Organizational commitment factors explain approximately 41% of total variance of learning organization (R²=0.406). 41% value of R² and F value in regression analysis show that the model has explanatory power. 41% value of R² indicates that organizational commitment influences learning organization in a good level. When the value β which expresses the power of independent variable to regress dependent variable is being look at, emotional commitment ($\beta =0.685$) has more influence than continuation commitment ($\beta =0.269$) on learning organization. It is observed that normative commitment has not effect on learning organization ($t= -0.582$).

Therefore, the hypotheses "H_{1a}: Emotional commitment has a positive effect on the level of becoming learning organization" is accepted. Hypothesis "H_{1b}: Normative commitment has a positive effect on the level of becoming learning organization" was rejected since no effect of normative commitment on learning organization has been found and hypothesis "H_{1c}: Continuation commitment has a negative effect on the level of becoming learning organization" is rejected because continuation commitment has a positive effect on learning organization. Therefore, while organizational commitment factors of emotional commitment and continuation commitment

have positive effects on learning organization, normative commitment has no effect.

DISCUSSION

According to definitive statistics, it has been found that organization levels of the organizations which are in the research sampling are high with 3.75 average. It has also been found that their organizational commitment for emotional commitment is higher than high level with 4.13; very close to high level with 3.84 for normative commitment, and in the medium level with 2.86 for continuation commitment. This indicates that these commitment levels are parallel to the conditions desired for an organization. It is found with the businesses in the research that emotional commitment and continuation commitment dimensions of organizational commitment influence learning organization and normative commitment has no influence, differing from the previous various studies on its influence on organizational dynamics. In the previous studies on different organizational elements of organizational commitment, it is generally found that emotional commitment and normative commitment have effects on several organizational elements while continuation commitment has no effect or has the least effect. The findings obtained in this research differ from those in the literature with this aspect.

In literature, organizational commitment is explained first as the emotional commitment, secondarily normative and lastly as continuation commitment (Brown, 2003). In the research, it is found that despite the expectancies, normative commitment was not and continuation commitment was affected by learning organization. There are different reasons for this result. The effect of continuation commitment to some organizational applications and dynamics was negative in almost all research. In a few research, though different from the literature, the effect of continuation commitment to some organizational applications and dynamics was positive and researchers faced difficulties to explain the reasons of this result.

In our opinion, the reason to this is explained by people's psychological reaction. Employees show different psychological reactions in researches which are about commitment as a psychological concept affecting different organizational issues like performance, empowerment, organizational culture, job satisfaction etc.

If organizational commitment scales are applied together with empowerment, organizational learning, individual success, job satisfaction etc. they can show different outcomes. The reason to this is employees' perceptions, cultural differences and preconceptions. This is a question on social science on perceiving and understanding scale questions correctly. In addition, it can be said life long employment policies are considered to be effective in the employees' continuation commitment to the organization positively.

In the foregoing, normative commitment is much more related to moral values. Moral values are created by the culture that people live in. Wasti says, Turkish workers' getting permission from their families when quitting their job is an example for their tendency to be effected by community culture because of not being fond of unknown future and change. As a result of this, they show continuation commitment tendency to stay connected to the organization (Wasti, 2000). There is no doubt that the employees involved in this research were effected by that. Therefore, cultural and moral differences are also considered to be the different results of this research.

Findings obtained with field research in this study indicate that organizational commitment is an element influencing learning organization. Within this framework, it is obvious that information age organizations need to obtain employers with high organizational commitment and take measures in order to increase their commitment in order to become learning organizations.

MANAGERIAL IMPLICATIONS AND RECOMMENDATIONS

Nowadays, due to the competition and rapid disburse of knowledge, organizations need to have educated employees who have speciality and high knowledge. This issue is very important for knowledge age organizations. Because of this importance, continuous share and creation of information is becoming important for organizations which use information technology. Therefore knowledge age organizations have to be a learning organization.

But leaders have some problems to create a learning organization. They always care about which steps they need to follow. This resource is not about these steps. It's about organizational commitment's importance to create a learning organization.

On the other hand, human is the single being that access knowledge, apply information to generate new knowledge, apply information to all organizational processes to become a learning organization. Employees as human beings carry out all organizational processes. Due to employees' importance in becoming a learning organization, employees' commitment to the organization is a requirement. It is difficult to transform to the learning organization without higher commitment. Learning starts with the individual and spread to the whole organization. Organizations afford continuous learning and compose organizational memory with their employees' commitment. In this way organizations become a learning organization.

To employ creative people and to keep them is essential. But it's not enough to reach organizational success. At the same time commitment to the organization is necessary for these employees to show extra effort. Thus

organizations can create an environment that provide work more than the job description (Schneider, Gunnarson and Niles, 1994).

Employees with or without less commitment to the organization tend to come to work late, even not come to work or quit work (Meyer and Allen, 1997:11). Organizational commitment not only decreases employee turnover but also orientate them to voluntary behaviour at all organizational processes. (Katz and Kahn, 1977).

Competition in knowledge age is more global, more customer oriented, more flexible, more learning based and teamwork based than it used to be during the past ten years. These tendencies which aim at learning organization entails people who combine their emotional, intellectual and physical energy with commitment for organizational success. (Ulrich, 1998).

If an employee who has high organizational knowledge and does not transform his tacit knowledge to explicit knowledge quits the job, organization can not manage knowledge and also can not become a learning organization. Organizations can learn and become a learning organization owing to their employees and employees' knowledge, experience, energy for work. Employees' commitment to the organization is very important to share their knowledge with the all organization. If employees have high commitment, they share all the knowledge they have.

On the other hand, nowadays human based management's importance has increased. Because of organizational commitment's effect on learning organizations, organizations are working on developing human resources to engage and keep employees' commitment high. Emotional commitment is more postulated than other commitment levels in commitment concept. But as controlling employees' emotional behavior is difficult, to afford employees' emotional commitment is difficult, too. So, researcher's studies on affording emotional commitment is necessary and these studies will benefit the organizations.

As Human Resource applications; in order to increase organizational commitment, organizations should; i) Empower their employees ii) Take precautions which increase motivation iii) Attach importance to the their creativity and thoughts iv) Encourage group works and award prize v) Provide them with access to the organizational knowledge vi) Encourage employees' participation in decision making vii) Compose organizational equity.

It would be appropriate for today's organizations to try to employ people who have tendency to have high organizational commitment, especially emotional commitment in the initial employment. Since this study is one of the rare studies conducted towards determining the relationship between learning organization and organizational commitment on the world, it both will allow comparability with studies in the same topic in different regions and

sectors or different cultures, and contribute to the improvement of literature in the field. Moreover, a better scale can be developed where learning organization and organizational commitment scales used together are improved by using businesses from different regions or cultures and where organizational commitment and learning organization scales are used together.

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Full Length Research Paper

Efficiency of foreign banks: Evidence from selected (Association of Southeast Asian Nations) ASEAN countries

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This study examined foreign banks efficiency in selected ASEAN countries (Indonesia, Malaysia, the Philippines, and Thailand) for the period of 2001 to 2008 by using the parametric stochastic frontier analysis (SFA) approach. The results indicate that foreign banks originating from developed countries are more cost and profit efficient as compared to foreign banks from developing countries. The results also show that foreign banks in Malaysia are the most cost and profit efficient while foreign banks in Indonesia are the least. The result is consistent with the difference in index of economic freedom over the years between the countries studied. Hence, to attract foreign banks into the ASEAN countries, authorities should liberalize their banking sector. Less restrictive banking sector will allow healthy competition between foreign and local banks in the developing countries resulting in higher overall banking industry efficiency.

Key words: Bank efficiency, foreign bank, stochastic frontier, tobit regression, Association of Southeast Asian Nations (ASEAN).

INTRODUCTION

The number of foreign banks in the ASEAN countries has expanded dramatically during the past decades due to worldwide financial globalization and liberalization. Financial liberalization contributes to significant shift in economic policy arising in international agreements which increased international capital mobility (Lim, 2004). This can be seen in a massive flow of capital into the emerging markets. In the past, the primary aim of multinational banking is for defensive expansion whereby banks follow their customers abroad to provide financing services to multinational firms. Today, foreign banks are encouraged to operate in emerging markets, partly, as a way to develop a more resilient financial system in the host country through advancement in terms of resource allocation, risk management, and corporate governance. Undeniably, foreign banks (particularly from the

developed countries) in the emerging markets such as in the Asian region provide technology spillovers into the banking system of the host countries.

Nevertheless there are concerns on foreign banks efficiency in the emerging markets especially when they decide on their expansion strategy. This is due to the constraints imposed on expansion policies as these banking markets are characterized with tight rules and regulations. This might lead to increase in the cost of operations and thus, prevent foreign banks to operate more efficiently.

As pointed out by Hymer (1976), foreign firms might face competitive disadvantages as compared to domestic firms because domestic firms have better access to information of the host countries in terms of the country's economy, language, law and politics. This is because the distance in terms of location and culture between the parent company and its local subsidiaries lead to less reliable accounting information from the borrowers. This eventually leads to asymmetric information problem and difficulties of the foreign banks' in designing policies to

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improve their performance in the developing countries. Lensink et al. (2008) argued that foreign banks might suffer from bad institutional framework which is prominent in the less developed financial system. This is supported by Mian (2006) in highlighting the issues of higher informational, agency, and enforcement costs due to the effect of institutional distance.

Notwithstanding a large recent literature on foreign bank efficiency, relatively little attention has been paid to comparing foreign banks efficiency across countries and the influence of foreign banks country of origin on efficiency. Hence, this study examines the efficiency of foreign banks in selected ASEAN countries. By doing so, the study can also determine whether there are differences in efficiency level among foreign banks across ASEAN countries and whether foreign bank's country of origin has any influence on efficiency.

The importance of foreign banks to the host country

The role played by foreign banks in the emerging markets is undeniably important as it brings in new technology especially in terms of innovation in financial products and risk management practices (Levine, 1996; Detragiache et al., 2006; Sturm and Williams, 2008). This enables them to provide better quality, pricing and more variety of products and services as compared to the domestic banking in the host country (Dages et al. 2000; Detragiache and Gupta, 2004). From risk management perspective, the technology brought by the foreign banks allow for greater diversification of exposures as more products are being introduced to the local market.

Apart from that, the entry of foreign banks into the emerging economies will insert more competitive pressure to the domestic financial institutions and thus, indirectly boost the efficiency of domestic banks. Furthermore, the utilization of modern technology and human capital from the parents companies indirectly improve banking practices and hence, efficiency in the host country as the domestic banks is exposed to the use of modern technology and expertise from a more developed banking system.

Foreign banks entry also provides alternative funding to the host country as it enables firms in the host country, access to international capital (Moreno and Villar, 2006). Consequently, foreign banks allow for wider and cheaper access of business funding which will eventually attract more clients (Dages et al., 2000; Hawkins and Mihajtek, 2001; Bonin et al., 2005). As pointed out by Moreno and Villar (2006) and Detragiache et al. (2006), foreign bank entry helps the host country to recapitalize their banking system especially after an economic shock as the foreign banks are backed by their parent banks and their accessibility to international financial markets. Besides that, foreign banks are able to diversify against country-specific risks across different geographical regions and hence, they are less sensitive to the host countries

economic cycles (Moreno and Villar, 2006). As highlighted by Kroszner (1998), foreign banks contribute to the improvement of banking practices in the emerging markets as they are less politically connected in their lending activities.

Foreign entry into the local banking market also contributes to a better corporate governance practices. This is especially true when there are foreign shareholdings in the domestic banks as their foreign counterparts require more transparency in their reporting. This will contribute towards more transparent corporate practices in the domestic banks and finally, contribute to increase efficiency in the overall banking industry in the host countries.

LITERATURE REVIEW

The analysis of foreign bank efficiency in the host countries mainly focuses on comparison between domestic and foreign banks. Fries and Taci (2005) analyzed cost efficiency of 289 banks in fifteen East European countries for the period of 1994 to 2001. They found that foreign ownership contributes to the improvement in banks cost efficiency. Besides that, state-owned banks were found to be the least cost efficient. Bonin et al. (2005) found similar results in their study on the impact of foreign ownership on banks efficiency in eleven transition countries. Their results suggest that foreign-owned banks are more cost efficient as they are able to provide better services with the aid of their strategic foreign owners.

Kraft et al. (2006) compare the efficiency between state-owned, private, and foreign banks in Croatia. Their results show that reputable foreign banks were able to exploit their expertise and consequently, more efficient as compared to state-owned and domestic banks.

Using data from 340 banks in 40 African countries as the sample, Figueira et al. (2006) examined the relationship between performance and ownership structure. They found evidence of foreign-owned banks superior efficiency compared to domestically-owned banks.

Nevertheless, there are results that show otherwise. Yao and Jiang (2007) in their analysis of technical efficiency of Chinese banks found that foreign banks in the Chinese markets seem to exhibit lower efficiency as compared to state-owned banks. Lensink et al. (2008) also found similar result. They argue that foreign banks are less efficient than domestic banks due to the institutional distance between the host and home country. Sturm and Williams (2008) found that increase in domestic market incumbency, reduce foreign banks efficiency level. However, they also argue that banks from home countries which are more financially sophisticated will be able to take advantage of the economic environment in the host country market and result in higher level of efficiency.

One could not ignore the impact of foreign banks on the domestic banking industry. Claessens et al. (2001) studied

the difference in performance between domestic and foreign banks. They found that while foreign bank entry reduces profitability, they also reduce overhead expenses of domestic banks. In other words, the entrance of foreign banks resulted in improvement in cost efficiency level of domestic banks. This is supported by Boubakri et al. (2005) in their analysis on profitability, economic efficiency, risk taking behavior and capital adequacy of newly privatized banks after controlling for ownership structure. Their results show that foreign banks' entry benefited domestic banking industry by bringing in sound bank's risk management strategy.

METHODOLOGY AND DATA

Cost efficiency deals with the basic economic concept of firm's cost minimization in the production of output. A cost efficient firm is said to operate at the costs near the "best practice" or the least cost firm. Clark and Siems, (2002) and Berger et al. (1997) states that the cost function of bank includes prices of the input vectors, quantities of outputs, and any fixed input or output that is needed for banking operation including environmental factors and random error that affect the bank's costs.

On the other hand, profit efficiency is a wider concept as compared to cost efficiency as it takes into consideration both costs and revenues in the analysis of efficiency. In the profit generation process, banks are not only required to control their operation cost, but also to decide on their pricing strategy in order to generate more revenue.

The two concepts being used in estimating profit efficiency are the standard profit and alternative profit. The standard profit function takes output prices as given while the banks are allowed to determine their output and input quantities in order to maximize profit. On the other hand, alternative profit function takes output quantities as given, but banks can have some market power to determine the market price of their products in the profit maximization process (Pulley and Humphrey, 1993; Berger et al., 1996). This study utilize the concept of alternative profit concept as it is believed that banks in Malaysia have, to some extent, market power, in setting price of financial services and products.

This study employs the parametric stochastic frontier approach (SFA) proposed by Aigner et al. (1977), Meeusen and van den Broeck (1977) in estimating the banks cost and profit efficiency. The cost and profit function is defined as a function of vector of outputs produced by the banks, vector of input prices, and a set of control variables. The general cost and profit specification are given thus:

$$TC_{kt} \text{ or } \pi_{kt} = f(P_{kt}, Y_{kt}, Z_{kt}) + \epsilon_{kt}$$

where: TC_{kt} = operating and financial costs for bank k at time t; π_{kt} = profit for bank k at time t; P_{kt} = vector of input prices for bank k at time t; Y_{kt} = vector of outputs for bank k at time t; Z_{kt} = inefficiency term is negative for profit efficiency and the profit control variables which affect the cost or profit function for bank k at time t; $\epsilon_{kt} = v_{kt} + u_{kt}$ error term in SFA. The error terms in SFA can be divided into two components; the non-negative random variables (u_{kt}) and random error term (v_{kt}). u_{kt} captures the production inefficiency in relation to the frontier.

On the other hand, v_{kt} is defined as the measurement error, statistical noise, and random shocks which cannot be controlled by the firms (Williams and Nguyen, 2005).

Translog cost and profit function is used in estimating cost and profit efficiency scores. This function is more flexible as it allows for multiple output technology without violating curvature conditions (Guala, 2002). In addition, the translog function also avoid the drawbacks of both CES and Cobb-Douglas production function which assume monotonically increasing or decreasing average cost curve (Murray and White, 1983). The multiple translog specification is shown in Equation 2 which is presented thus:

$$\begin{aligned} \ln TC_{kt} = & \alpha_0 + \sum_{i=1}^3 \alpha_i \ln Q_{ikt} + \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 \alpha_{ij} \ln Q_{ikt} \ln Q_{jkt} \\ & + \sum_{i=1}^3 \sum_{i=1}^3 \phi_{ij} \ln Q_{ikt} \ln P_{jkt} + v_{kt} + u_{kt} \\ & + \sum_{i=1}^3 \beta_i \ln P_{ikt} + \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 \beta_{ij} \ln P_{ikt} \ln P_{jkt} \end{aligned} \tag{2}$$

where: TC_{kt} = overall costs of banking include operating costs plus interest costs of bank k at time t ($t=1,2,\dots,T$); Q_{ikt} = outputs i ($i=1,2,3$) of bank k at time t; P_{ikt} = input prices for input factor i ($i=1,2,3$) of bank k at time t; v_{kt} = random error idd and $N(0, \sigma_v^2)$; u_{kt} = non-negative random variables i.i.d with truncations at zero on $N(u, \sigma_u^2)$ distribution.

The standard symmetry of input prices and outputs vectors are imposed by setting $\alpha_{ij} = \alpha_{ji}$ and $\beta_{ij} = \beta_{ji}$. Next, restrictions for homogeneity of input prices are imposed by setting $\sum_{i=1}^n \beta_i = 1$,

$$\sum_{i=1}^n \beta_{ij} = 0, \text{ and } \sum_{i=1}^n \phi_{ij} = 0. \text{ The cost efficiency is defined as } \frac{u_{\min}}{u_i}$$

where u_{\min} is the inefficiency associated with the best practice banks and u_i is defined as the inefficiency of i th bank. The inefficiency scores can be obtained by $\{E[\exp(u_{kt}) | \epsilon_{kt}]\}^{-1}$.

Profit before taxes is employed in the estimation of profit functions as it closely represents the operating profit of banks. To avoid a negative profit, a constant is added into the profit model. In this context, the dependent variable for the profit function is defined as $\ln(\pi + |\pi^{\min}| + 1)$ where $|\pi^{\min}|$ is the absolute value of

$$\text{minimum profits, } \pi. \text{ The profit efficiency is defined as } \frac{u_i}{u_{\max}}$$

u_{\max} is defined as the inefficiency associated with the best practice banks and u_i is defined as the inefficiency of i th bank. Hence, the sign of efficiency scores can be calculated by $E[\exp(-u_{kt}) | \epsilon_{kt}]$.

To further analyze the inefficiency effects of u_{kt} changed with time, the time-varying inefficiencies as in Battese and Coelli (1992) model is used and is presented thus:

$$u_{kt} = \{\exp[-\eta(t - T)]\}u_k$$

η is the parameter to be estimated and it will determine whether inefficiencies are time-varying or time-invariant; and u_{kt} is assumed to be i.i.d with truncations at zero of the $N(u, \sigma_u^2)$ distribution. If $\eta > 0$, then $-\eta(t - T) = \eta(T - t)$ is positive for $t < T$ and hence, $\exp[-\eta(t - T)] > 1$ that is cost or profit inefficiency decline over time. If $\eta = 0$, then cost and profit inefficiency is said to remain constant. On the other hand, if $\eta < 0$, then $-\eta(t - T) < 0$, this shows that cost and profit inefficiency of the foreign banks increase over time. The time-varying effect is important due to reason that foreign banks might take a longer time-span to realize their efficiency level in the host countries.

This study adopts the value-added approach proposed by Berger and Humphrey (1992) in determining the inputs and outputs vector of the banks. This approach treats deposits as outputs as it provides transaction and safekeeping services (Dietsch and Lozano-Vivas, 2000). Using this approach, three input vectors employed in this study are labor, physical capital and loanable funds which includes fund from deposits and also banks borrowing used in financing the creation of outputs. The price of labor is computed by dividing total personnel expenses with total assets of the banks. On the other hand, the price of physical capital is computed by dividing cost of capital, which is depreciation on fixed assets, with total fixed assets. The price of loanable funds is calculated by dividing total interest expenses incurred in deposits taking and borrowed funds with total loanable funds.

The three outputs vector specified in this study are total loans, total loanable funds that consist of deposits and other borrowed fund and other earning assets that represent the investment portion of the banks. Total cost of banks on the other hand, is obtained by adding up total operating costs and total interest expenses, whereas profit before tax can be obtained directly from the banks' annual reports. All outputs vectors, total costs and profit before taxes value are in USD million.

The sample of this study consist of 54 foreign commercial banks in four countries in the ASEAN region, which are, Malaysia, Indonesia, Philippines, and Thailand for the period of 2001 to 2007. The unbalanced panel data approach is used for the analysis with 327 numbers of observations. All data were obtained from the bank's annual reports in Bankscope.

RESULTS AND DISCUSSION

Table 1 presents the result of the maximum likelihood estimation of the cost efficiency equation using the Battese and Coelli (1992) model. The result is consistent with theory where total cost of commercial banks is positively related with price of inputs. The coefficient of price of labour is positively significant at the 1% level indicating that as the price of labour increase, total costs increase significantly. Eta (η) is positive indicating that foreign banks experience increase in cost efficiency over time (decrease in cost inefficiency). However, the reduction

in cost inefficiency is not significant.

Table 2 present the results of the maximum likelihood estimation of the stochastic profit frontier equation. The results of the estimation are consistent with theory, where the price of inputs is negatively correlated with profit. This holds as price of inputs increase, banks have to incur higher costs for acquiring factors of production and therefore, resulted in lower profits. In addition, Eta (η) is found to be positive and again, this shows that profit efficiency improve overtime (decrease in profit inefficiency). Nevertheless, the improvement in profit efficiency is not significant.

To further analyze the foreign banks efficiency in ASEAN, descriptive statistics are computed and presented in Table 3. Results in Table 3 show that foreign banks in ASEAN are more profit efficient, rather than cost efficient with an average profit efficiency of 76.57%. This means that banks could have increased 23.43% of their profit at the given level of output. In addition, the average cost efficiency scores of 75.90% indicate that foreign banks wasted 24.10% of the inputs in producing output. The results also indicate that the standard deviation is higher for cost efficiency compared to profit efficiency. This means that the variation in cost efficiency is higher as compared to profit efficiency. Results also show that the lowest value of cost efficiency scores is 5.84%.

Next, this study further analyze whether there are significant difference in efficiency scores between foreign banks originated from developed and foreign banks originated from developing countries by using two-sample t-test. The results of the t-test for the differences in average cost and profit efficiency for the two samples are given in Table 4. The t-test for equal variances is used for the analysis as the Levine's test shows that there are no significant differences in the variance of efficiency scores between foreign banks originated from developed and developing countries. The F-statistics based on the Levine's test are 0.4486 and 0.1323 for cost efficiency and profit efficiency, respectively.

The results in Table 4 clearly indicates that foreign banks originated from developed countries, are more cost and profit efficient than the foreign banks originated from developing countries, and it is statistically significant at 5 and 1% level respectively. This might be due to the reason that the foreign banks from developed countries have more efficient management team and are more technologically advanced as compared to foreign banks from developing countries. This enables them to perform better as results of better human resources and technological advancement which is consistent with theory.

To analyze cost and profit efficiency differences of foreign banks across countries, the descriptive statistics is computed and presented in Table 5. The results in Table 5 show that foreign banks in Malaysia are relatively more cost and profit efficient compared to foreign banks in other ASEAN countries. The average cost and profit efficiency reported are 83.15 and 78.57% respectively.

Table 1. Maximum likelihood estimates of the stochastic cost frontier.

Dependent variable: Total cost				
Variable	Coefficient	t-ratio	Coefficient	t-ratio
Constant	1.761	2.210**	1.761	0.338
LNSTAFF	0.809	2.129**	0.809	0.362
LNCAP	0.176	1.131	0.176	0.328
LNINT	0.231	1.139	0.232	0.347
LNLOAN	0.330	1.049	0.330	0.278
LNDEP	0.138	0.300	0.138	0.093
LNINV	0.461	2.570	0.461	0.483
STAFF2	0.130	2.648***	0.130	0.620
CAP2	-0.008	-0.761	-0.008	-0.202
INT2	0.126	3.184***	0.125	1.038
LOAN2	0.090	3.055***	0.090	1.235
DEP2	0.417	3.121***	0.417	1.272
INV2	0.094	3.104***	0.095	0.898
STAFFCAP	0.059	1.717	0.059	0.538
STAFFINT	-0.248	-3.139***	-0.248	-1.663
CAPINT	-0.037	-0.723	-0.037	-0.424
LOANDEP	-0.389	-2.727***	-0.389	-1.032
LOANINV	0.163	2.141**	0.163	0.542
DEPINV	-0.375	-3.245***	-0.375	-1.189
STAFFLOA	0.071	0.898	0.071	0.321
STAFFDEP	-0.220	-1.769*	-0.220	-0.825
STAFFINV	0.168	2.688***	0.168	1.012
CAPLOAN	-0.012	-0.245	-0.012	-0.068
CAPDEP	-0.029	-0.382	-0.029	-0.128
CAPINV	0.044	1.477	0.044	0.389
INTLOAND	-0.193	-3.458***	-0.192	-0.787
INTDEP	0.393	4.387***	0.393	1.304
INTINV	-0.237	-5.210***	-0.237	-2.261
Eta (η)			0.010	0.230
λ	63.673	2.669***	2.996	77.868***
σ	0.735	484.284***	0.697	18.438***
σ_v	0.735		0.735	
σ_w	0.012		0.697	
Log likelihood	-138.272		2.260	

Significant at **5% and ***1% levels.

The results also indicate that cost efficiency varies significantly among banks in Indonesia (scores range from 5.84 to 91.74%) as compared to other countries. Likewise, the profit efficiency scores for foreign banks in Indonesia also vary significantly ranging from 29.06 to 98.05%. To see whether there is a change in efficiency level across time, the annual cost and profit efficiency scores for each country is also presented in Table 6. The average cost and profit efficiency scores show an increasing trend over the period. This is consistent with the maximum likelihood results reported in Tables 1 and 2. In addition, it also confirms that foreign banks in

Malaysia are more cost and profit efficiency as compared to the other ASEAN countries.

The t-test for the differences in average cost and profit efficiency are computed for each country and the results are presented in Table 7. The t-test for unequal variances is used for the analysis as the Levine's test shows that there are differences in variances of cost and profit efficiency scores across countries. The reported F-test from Levine's test for cost efficiency is 181.771 and it is statistically significant at 1% level. On the other hand, the F-test for profit efficiency is 261.678 which are also statistically significant at 1% level.

Table 2. Maximum likelihood estimates of the stochastic profit frontier.

Dependent variable: Total profit				
Variables	Coefficient	t-ratio	Coefficient	t-ratio
Constant	5.750	5.418***	5.750	1.088
LNSTAFF	-0.339	-0.718	-0.339	-0.130
LNCAP	-0.144	-0.759	-0.144	-0.295
LNINT	-0.016	-0.06	-0.016	-0.013
LNLOAN	0.035	0.122	0.035	0.060
LNDEP	-0.213	-0.564	-0.213	-0.165
LNINV	-0.083	-0.352	-0.083	-0.069
STAFF2	-0.051	-0.943	-0.051	-0.177
CAP2	-0.009	-0.892	-0.009	-0.376
INT2	-0.017	-0.388	-0.017	-0.175
LOAN2	0.020	0.837	0.020	0.231
DEP2	0.051	0.501	0.051	0.169
INV2	0.029	0.952	0.029	0.317
STAFFCAP	-0.056	-1.501	-0.056	-0.817
STAFFINT	-0.004	-0.062	-0.004	-0.016
CAPINT	0.013	0.323	0.013	0.195
LOANDEP	-0.065	-0.557	-0.065	-0.166
LOANINV	0.006	0.086	0.006	0.029
DEPINV	-0.034	-0.36	-0.034	-0.138
STAFFLOA	-0.009	-0.131	-0.009	-0.035
STAFFDEP	-0.021	-0.23	-0.021	-0.060
STAFFINV	-0.009	-0.175	-0.009	-0.045
CAPLOAN	-0.089	-1.938	-0.089	-1.016
CAPDEP	0.090	1.401	0.090	0.652
CAPINV	-0.016	-0.54	-0.016	-0.193
INTLOAND	-0.017	-0.292	-0.017	-0.087
INTDEP	-0.014	-0.156	-0.014	-0.064
INTINV	0.015	0.289	0.015	0.116
Eta (η)			0.010	0.173
λ	2.801	11.382***	2.801	18.812***
σ	0.467	459.018***	0.440	9.708***
σ_v	0.440		0.440	
σ_w	0.157		0.157	
Log likelihood	-56.704		-516.950	

Significant at **5% and ***1% levels.

Table 3. Descriptive statistics for cost and profit efficiency across countries from year 2001 - 2008.

Descriptive statistics	Cost efficiency	Profit efficiency
Mean	0.7590	0.7657
Standard deviation	0.2115	0.0927
Minimum	0.0584	0.2906
Maximum	0.9174	0.9805
Count	327	327

The results in Table 7 clearly indicate that there are significant difference in average cost efficiency between

foreign banks in Malaysia and foreign banks in other ASEAN countries. This again confirms the analysis that

Table 4. Two-sample t-test assuming equal variances for cost and profit efficiency of foreign banks from developed and developing countries.

Cost efficiency	Developed	Developing
Mean	0.7743	0.7118
Variance	0.0340	0.0758
Observations	247	80
t-stat	2.3105**	
P(T<=t) two-tail	0.0215	
t Critical two-tail	1.9673	
Profit efficiency		
Mean	0.7813	0.7175
Variance	0.0030	0.0229
t-stat	5.5948***	
P(T<=t) two-tail	0.0000	
t Critical two-tail	1.9673	

Significant at **5% and ***1% levels.

Table 5. Descriptive statistics for cost and profit efficiency for each country from year 2001 – 2008.

Descriptive statistic	Indonesia	Malaysia	Philippines	Thailand
Cost efficiency				
Mean	0.7466	0.8315	0.7397	0.7329
Standard Deviation	0.2613	0.0592	0.0147	0.0432
Minimum	0.0584	0.7183	0.0073	0.6702
Maximum	0.9174	0.9071	0.8701	0.8137
Count	202	56	34	35
Profit efficiency				
Mean	0.7641	0.7857	0.7756	0.7334
Standard Deviation	0.0998	0.0558	0.0389	0.1231
Minimum	0.2906	0.6847	0.6841	0.5310
Maximum	0.9805	0.8862	0.8112	0.8574
Count	202	56	34	35

foreign banks operating in Malaysia exhibit higher cost efficiency as compared to foreign banks operating in other countries in the region. On the other hand, the results show no significant difference in average cost efficiency between foreign banks operating in Indonesia, Philippines, and Thailand. The results also show that there are significant differences in average profit efficiency scores between foreign banks operating in Malaysia with their counterparts in Indonesia and Thailand. Hence, it can be concluded that foreign banks in Malaysia are relatively more cost and profit efficient as compared to foreign banks operating in Indonesia, Thailand, and Philippines.

The findings that foreign banks in Malaysia are more

efficient as compared to other countries in the ASEAN region might be due to the relatively high economic freedom in Malaysia over the years. The overall economic freedom index for Malaysia shown in Table 8 increase gradually from 2001 to 2008, while for other countries in the region, it seems to be decreasing and fluctuating over time.

Trade restriction in Malaysia is also relatively less as compared to the other countries. This might also contribute to the efficiency of foreign banks in Malaysia as they are less restriction in bringing in their capital into Malaysia. The investment freedom and financial freedom index indicates that foreign banks in Indonesia are subjected to significant restriction where foreign investors

Table 6. Descriptive statistics for cost and profit efficiency for each country for each year.

Country	2001	2002	2003	2004	2005	2006	2007
Average cost efficiency scores							
Indonesia	0.7208	0.7298	0.7360	0.7246	0.7280	0.7717	0.8142
Malaysia	0.8270	0.8285	0.8300	0.8315	0.8330	0.8345	0.8359
Philippines	0.7716	0.7736	0.7849	0.7249	0.7168	0.7191	0.7533
Thailand	0.7262	0.7284	0.7307	0.7329	0.7351	0.7374	0.7396
Average profit efficiency scores							
Indonesia	0.7523	0.7635	0.7588	0.7596	0.7676	0.7729	0.7715
Malaysia	0.7801	0.7820	0.7839	0.7858	0.7876	0.7895	0.7913
Philippines	0.7949	0.7967	0.7572	0.7713	0.7757	0.7777	0.7763
Thailand	0.7268	0.7290	0.7312	0.7334	0.7356	0.7377	0.7399

Table 7. Two-sample t-test assuming unequal variances.

Country	Indonesia	Malaysia	Philippines
Cost efficiency			
Indonesia			
Malaysia	-4.2395***		
Philippines	0.2943	5.5088***	
Thailand	0.6948	9.1608***	0.4167
Profit efficiency			
Indonesia			
Malaysia	-2.1104**		
Philippines	0.1186	1.010	
Thailand	1.4001	2.3687**	1.9335

Significant at **5% and ***1% levels.

face strict restrictions on access to foreign exchange and international payment since 2004. In addition, there are extensive government influences in the banking sector where government exercise active ownership and control on banks since 2004. All of this might explain a relatively low cost and profit efficiency level for foreign banks in Indonesia. The results support Hymer (1976) claims that foreign firms faced competitive disadvantages due to information asymmetry resulted from restrictions in the emerging countries. Besides that, Lensink et al. (2008) argued that foreign banks might suffer from bad institutional framework in the host country which is especially prominent in the less developed financial system. This explains a relatively low cost and profit efficiency scores in the ASEAN region especially in countries with significant government intervention.

In addition, Hymer (1976) also suggested that foreign firms might lose out in the host country because of the differences with the country's economy, language, law and politics. This is because distance in terms of location

and culture between the parent companies and local subsidiaries lead to less reliable accounting information from the borrowers and hence resulted in banks lower efficiency level. This is supported by Mian (2006) highlighting the issues of higher informational, agency, and enforcement costs due to the effect of institutional distance.

The results of this study is consistent with study by Yao and Jiang (2007), Lensink et al. (2008) and Sturm and Williams (2008) where foreign banks are found to be inefficient in the their study on the foreign banking efficiency in the developing countries.

Conclusion

This study examined foreign banks efficiency in ASEAN countries for the period of 2001 to 2008, using the parametric stochastic frontier analysis (SFA) approach. By doing so, the study can also determine whether the

Table 8. Economic freedom index from year 2001 to 2007.

Country	2001	2002	2003	2004	2005	2006	2007	2008
Overall score								
Indonesia	52.5	54.8	55.8	52.1	52.9	51.9	53.2	53.2
Malaysia	60.2	60.1	61.1	59.9	61.9	61.6	63.8	63.9
Philippines	60.9	60.7	61.3	59.1	54.7	56.3	56.0	56.0
Thailand	68.9	69.1	65.8	63.7	62.5	63.3	63.5	62.3
Trade freedom								
Indonesia	67.2	72.6	74.6	74.2	77.2	74.6	74.0	73.0
Malaysia	66.0	66.6	73.0	73.4	75.8	76.6	76.8	76.2
Philippines	68.4	71.6	77.4	77.0	79.4	79.8	79.8	78.8
Thailand	77.6	77.8	64.8	65.6	67.6	68.4	74.2	75.2
Investment freedom								
Indonesia	50	50	50	30	30	30	30	30
Malaysia	30	30	30	30	30	30	40	40
Philippines	50	50	50	50	30	30	30	30
Thailand	70	70	50	50	30	30	30	30
Financial freedom								
Indonesia	30	30	30	30	30	30	40	40
Malaysia	30	30	30	30	30	30	40	40
Philippines	50	50	50	50	30	50	50	50
Thailand	50	50	50	50	50	50	50	50

foreign bank's country of origin has any influence on efficiency.

Results show that foreign banks originating from developed countries are more cost and profit efficient as compared to foreign banks from developing countries. This is consistent with theory that suggests firms from developed countries are able to perform better in terms of foreign investment as a result of superior management and technological advancement. In addition, the results found that foreign banks in Malaysia are more cost and profit efficient, relative to foreign banks in other ASEAN region. This might be due to the fact that Malaysia has developing countries. The results are also consistent with relatively high economic freedom over the years as compared to the other countries in the region.

Foreign banks in Indonesia are found to be the least cost and profit efficient. This might be due to the restriction faced by foreign banks in expanding their banking operation and to compete freely with the local banks. The results supported Hymer (1976) and Lensik et al. (2008) argument that foreign firms face competitive disadvantages due to poor institutional framework resulting in information asymmetry in less developed countries. This explains the relatively low cost and profit efficiency scores in the ASEAN region, especially in countries with more government intervention. Mian (2006) argued that the issues of higher informational, agency and

enforcement costs due to institutional distance will result in lower efficiency level of foreign banks in the studies by Yao and Jiang (2007), Lensink et al. (2008) and Sturm and Williams (2008).

Hence, to attract foreign banks into the developing countries, it is suggested that the authorities should liberalize the banking system. Less restrictive banking system will allow healthy competition between foreign and local banks in the developing countries resulting in higher overall banking industry efficiency. Besides that, foreign banks should consider the rules, regulations and the host country's characteristics before entering foreign market. It is suggested that future studies should include the host country's characteristics as factors in influencing efficiency of foreign banks.

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Full Length Research Paper

Training, motivation and teamwork improvement: The case of construction firms

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A powerful human resource development system is a critical strategy for every construction companies, as in the coming years, human capital plays a significant role in order to have a successful organization. Based on a combination of literature research and questionnaire surveys, the study explores the effect of training and motivation in HRD practices on teamwork improvement in construction firms. The research was conducted by sending 50 sets of questionnaires to the nominated contractor firms in Mashhad, Iran. The analysis methods in this research were mainly descriptive and regression analysis and the type of investigation was co-relational study. The research found that the percentage of skilled and unskilled labour in the construction companies, some barriers and solutions of training and motivating workforces and the relationship between training and motivation practices in teamwork improvement. Future research should try to address on how companies can shape the environmental and organizational settings in order to motivate staff and workers for training and development.

Key words: Human resource development, training, motivation, teamwork improvement, construction.

INTRODUCTION

A powerful human resource development (HRD) system is a critical strategy for construction companies, as in the coming years, human capital plays a significant role in order to have a successful organization (Buyens et al., 2001; Iatagana et al., 2010). HRD is concerned with the provision of learning and development opportunities that support achievement of business strategies and improvement of organizational, team and individual performance (Lengnick-Hall et al., 2009; Tseng and Lee, 2009; Wang et al., 2010). The importance of involving human resources (HRs) in development, planning and implementation of competency-based strategies has been emphasized by a number of researchers (Buyens et al., 2001; Iatagana et al., 2010). In this regard, training and motivation of employees at all levels within organizations have been considered a vital component in maintaining competitiveness in the international arena. On the other hand, the construction industry plays a significant role in the Iranian economy. According to the

report of the Ministry of Housing and Urban Development (MHUD), the construction industry employs more than 11% of the working population in the country. Over the past decade, nearly 40% of total annual investment was in this sector, where it has generated more than 8% of GDP (Chatterton et al., 2004). Therefore, the dynamic external environments within which many construction businesses currently operate require that they develop a capacity for training and learning faster than competitors.

The previous research, which was conducted by Tabassi and Bakar (2009), revealed that many of Iranian labour have low levels of education, low income, lack of motivation and family struggles. Their investigation has shown only 20% of Mashhad construction work forces were skilled labour and nearly 92% of the companies and their projects faced damages due to this shortfall. Furthermore, Iran is an earthquake prone country that has experienced more than 130 strong earthquakes with a magnitude of seven or more in past centuries. The past earthquakes in the country destroyed many towns and thousands of villages, and caused extensive economic damage; Mehrabian and Haldar, 2005; Tabassi and Bakar, 2009).

According to Tabassi and Bakar (2009), most of the

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damage referred to unskilled workforces that appointed to the projects in different part of the country. Considering the significance of these issues and the question of why many buildings were destroyed during the past earthquakes in Iran, a lack of skilled labour in construction projects of Mashhad was revealed in the study of Tabassi and Bakar. Therefore, the current research attempts to study on training and motivation in HRD practices and evaluates their effects and relation-ships on teamwork improvement of the construction companies in Iran.

LITERATURE REVIEW

Ever since the advent of the term "human resource development", it has come to be used in various contexts. This has led to considerable perplexity with various individuals, organizations and professional bodies applying the label to widely differing activities (Huemann, 2010; Slotte et al., 2004). Nadler and Nadler (1989) define HRD as managed and organized learning experiences provided by the contractor, for a certain period for the purpose of improving and enhancing job performance and providing growth for individuals and companies. Garavan et al. (1995) in their article indicate that American Society for Training and Development (1990) asserted that HRD includes "training and development, organization development, and career development". In addition, Garavan (1991) defines it as the strategic management of training, development and management professional education interventions. According to Garavan, HRD aimed at facilitating the attainment of organizational aims, while at the same time ensuring the full employment of the knowledge and skills of employees.

HRD, as an academic discipline, is now defined the development of learning including knowledge and expertise and the improvement of performance. It considers a multi-level concept in that it focuses on individual, group, and organization issues. As a discipline, it relies on theories that describe the process of training and theories of organizational learning and changes. However, HRD is still considered with formless and penetrable boundaries (Garavan and Morley, 2006).

The numbers of critical research, studies, developments and analyses of HRD theories have been limited in the past two decades. Since the commencement of the term HRD arisen (attributed to Leonard Nadler in the early 1970s), two approaches developed to HRD (Simmonds and Pedersen, 2006). On one side, the British investigators and researchers have followed a learning and development paradigm, which concentrated on strengthened training and development issues (Garavan, et al., 1999; McGoldrick et al., 2002).

On the other side, the American researchers emphasized performance outcomes paradigms which concentrated on developing employees to enhance and improve organisational performance outcomes

(Sambrook, 2004; Swanson and Holton, 2001). Accordingly, the US literature is strongly biased towards performance in HRD definitions (Lengrick-Hall and Lengrick-Hall, 1988). For instance, Sambrook (2004) synthesizing US definitions, posits that HRD is a process concerned with developing human expertise for the purpose of improving performance.

To sum up, because this research evaluates the effect of training and motivation in HRD practices on teamwork improvement of the construction firms, it finds the definitions of HRD, which were defined by American researchers such as Armstrong and Baron (2002) and Sambrook (2004), more comprehensive. They state that HRD is concerned with the provision of learning and development opportunities that support the achievement of business strategies and improvement of organizational, team and individual performance.

Training and development

The Oxford English Dictionary definition of training defines it as a practical education in any profession, art or craft. The HRD definitions are not differing significantly. It is generally stated as a systematic and planned effort to modify or develop knowledge, attitudes, abilities and skills through learning experiences, to attain effective performance in an activity or a range of activities (Garavan et al., 1995; Reid et al., 1992). Many definitions and interpretations of training and development can be found within the HRD literature. For instance, Van Wart et al. (1993), suggest that "training is application driven and aims to impart skills that are useful immediately in particular situations". They argue that although general principles are introduced in training, discussion of them is limited because they are used to reinforce specific learning points. Swanson and Holton (2001), define training and development as a process of systematically developing work-related knowledge and expertise in people for improving performance. While providing specific training, a training and development effort can further be designed to increase an individual's level of self-awareness, skills and motivation to perform his or her job well. On the other hand, training and development are generally considered as planned effort by an organization to facilitate the learning of job-related behaviour on the part of its employees. Job-related behaviours can include any knowledge and skill acquired by an employee that can be related to organizational goals (Wexley and Latham, 1991). In addition, McLagan (1989) defines training and development as identifying, assuring and helping to develop the key competencies that enable individuals to perform current or future jobs (cited in Wan, 2007). According to the above definitions, training was considered as a process. Therefore, it needs the effective ways and methods in order to improve the performance. Thus, organizations are required to find proper training

methods in HRD practices for training the staff and labour. Accordingly, the key themes of training and development are learning and individuals in organizations (Russ-Eft et al., 1997). Therefore, the field of training and development is directed toward individuals, and learning is its key method of inducing change (Rothwell et al., 1995).

Furthermore, the construction sector has been considered as one of the most dynamic, active and complex industrial environments by different practitioners (Druker et al., 1996; Loosemore et al., 2003; Wild, 2002). The requirements for construction work and their changes oblige the formation of bespoke teams each time a new project is undertaken. The external sources of labour are also very common in the industry (Debrah and Ofori, 1997; Langford et al., 1995; Winch, 1998). In fact, it is accepted that construction firms face with many difficulties in training and developing their labour and staff (Loosemore, et al., 2003; Raiden and Dainty, 2006).

Therefore, managers, executives and supervisors can have a significant constructive impact on transfer of training (Jong et al., 1999). The training of extension personnel contributes directly to the development of HRs within extension organizations. In addition, training plays a critical role in increasing workers' adaptability and flexibility, which employers have found is becoming increasingly important. Thus, it is important for an organization to maintain a necessary competence in its employees through adequate training (Tai, 2006). Training has to start with the recognition of training needs through job analysis, performance assessment, and organizational analysis. Once the training needs of extension personnel have been identified, the next step is to organize training programs. Methods such as role-playing, simulation exercises, and case study can be used in extension construction industry to create learning situations based on experience.

The effective methods can be used for training construction workers are on-the-job training, off-the-job training (Smith, 2002), and distance education (Sadler-Smith et al., 2000). Table 1 makes a comparison between on and off-the-job training. It indicates the essential parts as well as the differences between these two methods of training. For more details about on and off-the-job training see Van Wart et al. (1993), Garavan et al. (1995), and Reid et al. (1992).

Distance education techniques can be very useful though in the provision of learning materials, and the provision of a structure to the learning. In an earlier investigation by Smith (2002), it was suggested that the methods of distance education could be effective where there is a learning relationship established on-the-job between the learner and the trainer such that both use the distance learning materials to structure activities, to access content knowledge, and to determine sequence and progression of learning. Sadler-Smith et al. (2000) usefully review what they have called "modern learning

methods", with some emphasis on the application distance education techniques. They investigated the correlation between perceived effectiveness of a number of different training delivery options and their frequency of use. Using a set of training delivery options that include off-site courses, on-site courses, on-job training, distance learning, work shadowing and job rotation, they had shown distance learning to be used less widely and to be considered less effective in contrast to at-job methods, which were used widely and seen to be effective. It is suggested here, though, that it is quite artificial to separate distance learning from other methods of training. Indeed, distance learning methods and materials can be used on-the-job, as part of a suite of training methods, and can reduce the need for learners to be removed from their workplace to pursue learning needs. In line with training practices, motivation has also played a significant role in training effectiveness.

Motivation for training

Motivation is defined as "variability in behaviour not attributable to stable individual differences (for example, cognitive ability) or strong situational coercion" (Quiñones, 1995). That means motivation is a characteristic of an individual willing to expend efforts toward a particular set of behaviour. In a training context, motivation can influence the willingness of an employee to attend the training program (Maurer and Tarulli, 1994; Noe and Wilk, 1993), to exert energy toward the program and to transfer what they learn in the program onto the job. Thus, it is likely that trainees cannot obtain all the benefits of training practices without considering training motivation. Several researchers have shown an association between training motivation and training effectiveness in their studies (Facteau, et al., 1995; Noe and Wilk, 1993; Quiñones, 1995). In some studies, also, it is revealed that the motivation played a more determinant role than other individual factors concerning training performance (Tai, 2006). Since, training is one of the most important strategies for organizations to help employees gain proper knowledge and skills needed to meet the environmental challenges (Goldstein and Gilliam, 1990; Rosow and Zager, 1998); thus, researchers have focused on exploring ways to increase the effectiveness of training. In this, one of the critical determinants of training effectiveness is the trainees' level of training motivation (Mathieu et al., 1993; Tannenbaum and Yukl, 1992). Furthermore, Noe (1993) suggests that characteristics such as "motivation" and "attitudes" are factors that play a critical role in achieving training effectiveness within employees. As stated before, in a training program, motivation influences the willingness of an employee to attend training in the first place (Maurer and Tarulli, 1994; Noe and Wilk, 1993). It can also affect a trainee's decision to exert energy toward the training program. Even if trainees possess the ability

Table 1. Off-the-job training versus On-the-Job training.

Variable	Off-the-job training	On-the-job training
Emphasis On:	Learning basic facts and skills	Getting the job done
Ultimate Goal:	"Knowing"	Developing "best practices"
Knowledge:	Static, Decontextualized, General	Dynamic, Situated, Practice-oriented
Topics / Problems:	Given by curriculum	Arise from and embedded in work situation
Scope of Learning:	Primarily Individual	Individual, Group, Organization

Source: Tabassi and Bakar (2009).

to learn the content of a course, they may fail to benefit from training because of low or lack of motivation. That is, training performance will only be strengthened when trainees have both the capability and the motivation to learn. In addition, Quiñones (1995) concluded that many researchers suggested the characteristics of trainees such as motivation and attitudes are more important to training success than are course-content variables. Therefore, the motivation of trainees plays an important role in the effectiveness of the training programs.

On the other hand, the key of motivating employees is finding proper ways to satisfy their needs and desires. Each individual has different needs, wants and desires. The needs can be broken down into a few basic categories for construction workers such as workers participation, recognition, and team belonging (Tabassi and Bakar, 2009). For workers participation, many employees are motivated when they are "empowered" and feel that their participation is significant in making the company successful. When employees find themselves empowered in such ways, they will work in ways that meet not only their own needs and desires but also the needs and wants of the company as a whole. In the words of Nesan and Holt (1999): "The participative approach addresses development of good supervisor-subordinate relationships and cohesive work groups in order to satisfy both social needs and the needs of business demand". To encourage worker participation, leaders and managers are advised to use a system that identifies and rewards workers who do a good job. For example, construction workers can receive a financial bonus for attending to the training programs, developing the company's performances and identifying ways to improve the quality of their company's operations (Bart, 1996). Olomolaiye et al. (1998) declared the money is an influential motivator and claimed that a well-designed reward system will "lead to higher productivity for the employer and extra pay for the employees for their efforts".

Recognition, aside from financial inducements, is also regarded as a powerful means to inspire enthusiasm among employees. Nesan and Holt (1999), furthermore, note that "positive reinforcement" is especially effective when it is applied to teams, rather than individuals and they recommend, for example, giving an award of recognition to the "Crew of the Month". According to

these authors, although financial incentives are useful in motivating construction employees, studies have also "revealed that several people had achieved significant success with recognition as opposed to rewards". When leaders or managers make a system of recognition in their companies, therefore, the employees will be more motivated for training and development.

Finally, team belonging is another powerful incentive for construction workers. According to Bart (1996), workers feel more inspired when they belong to a team where they are making their suggestions freely, because the feeling of participating in a group is one of the basic and essential needs of human soul. Nesan and Holt (1999) also noted that teams are especially motivated when they are given the opportunity to "self-manage". This situation "allows participation among the group members, while the group as a whole is given increased responsibility for decision making." A related concern is that of cultivating good relationships among all the members of the organization. Creating a team belongingness environment make employees more motivated for training and development. Also, they can encourage their colleagues and peers in learning and developing their skills and knowledge. When employees find themselves belong to a team in such ways, they will exert more energy towards the successes of the group and company as a whole.

Teamwork

A high performance workplace focuses on increasing people's influence on the business as well as the impact of processes, methods, the physical environment and technology and tools that enhance their work (Ahadzie et al., 2008). A high performance workplace invests in its human resources and supports their technical and innovation skills. In the case of the construction industry, the project teams form the focus of working life in the industry. According to Raiden and Dainty (2006), the changing requirements of construction activities necessitate the companies to form different teams each time a new project is undertaken. "Therefore, any policies and practices that are applied by the companies in order to improve teamwork activities can have effects on the performance of their projects (Tabassi et al., 2011)." For

some, the topic of teamwork in organizations is of only peripheral concern. However, it is worth noting Blanchard's (1988) comments: "most managers spend no less than 50% and possibly as much as 90% of their working time in some type of teamwork activity. Teams are the backbone of organizations. They can produce more and better solutions to problems than individuals can".

Objectives of the study

Mashhad is the second largest city of Iran in terms of population, area and construction projects (Tabassi and Bakar, 2009). According to the Seismic Design Code for Buildings (standard 2800) of Iran, the city is located in the area with the highest risks of earthquakes. There are various construction projects like residential, official, recreational, entertainment, religious, and hotel buildings. Consequently, a lot of workers and construction practitioners are allocated to the projects. Furthermore, less attention has been given to HRD practices in construction firms in Iran by researchers and practitioners. Hence, due to the shortfalls and a lack of potential studies on this topic, this research proceeds with the following objectives:

1. To study labour training and motivation in HRD practices in contractor firms in Mashhad, Iran; and
2. To study the relationship between training and motivation practices with teamwork improvement in contractor companies in Mashhad, Iran.

METHODOLOGY

The aims of the study are evaluating training and motivation methods in HRD practices and find their effects on teamwork improvement of construction projects especially in Mashhad. A quantitative research approach was adopted for this research requiring the development and dissemination of a questionnaire survey. The respondents include all personnel who have direct managerial experiences in construction companies. Accordingly, they were approached through contractor firms, which were registered in Management and Planning Organization of Iran (MPO), Khorasan-e-razavi branch. According to the statistics of MPO, 67 companies were registered as contractor companies in Grades One, Two and Three in Mashhad. Contractor companies in Iran are ranked in five grades from one to five by the MPO of the country. Grade one is the largest and Grade Five is the smallest company's grad. Companies are ranked by the certain rules and regulations of MPO. Table 2 indicates the ranking of the contractor companies according to the MPO regulation, criteria and formula. For instance, companies who are becoming a candidate for Grade One must acquire minimum 3,000 scores of personal resources, 5,000 scores for tract record, performance, and experiences, and at least 10,000 scores for financial ability and assets. Also, they can be involved in tenders with the maximum price of 40,000 million Rials (equal to approximately 40 million USD).

Survey was conducted where 50 sets of questionnaires were sent out to the group of respondents at random by postal mail and e-mail in Mashhad for a period of two months and 32 sets (64%) of surveys were returned and usable. After all the primary data collected and processed, the data was analyzed according to the

appropriate analysis methods. Analysis methods in the research were mainly descriptive and regression analysis and the type of investigation was co-relational study. SPSS and AMOS software were also used in analyzing the data. In another investigation, which was conducted by Tabassi and Bakar (2009), HRM practices in training labour in different types of companies such as contractors, developers, consultants, and project management companies were evaluated in Mashhad. All the companies in that research were registered in the Khorasan Civil Engineering System Organization. The current research aims to concentrate on contractor companies because of their direct relation to the labour training and motivation practices in the development process; and make a comparison with the result of the past research.

Data analyses

As mentioned earlier, the companies, which were surveyed through the research, were registered in the MPO of the country as contractor firms. They were in three categories: governmental, semi governmental and private. Most of the respondents (81.25%) were private companies, 12.5% governmental and 6.25% were semi governmental companies. In addition, the respondents' responsibilities were project managers, executive managers and company managers as shown in Figure 1. The result shows that all the respondents were directly related to HRD strategies for their companies. Therefore, their responses and ideas have strong effects on the results of the study and confirm its credibility as well.

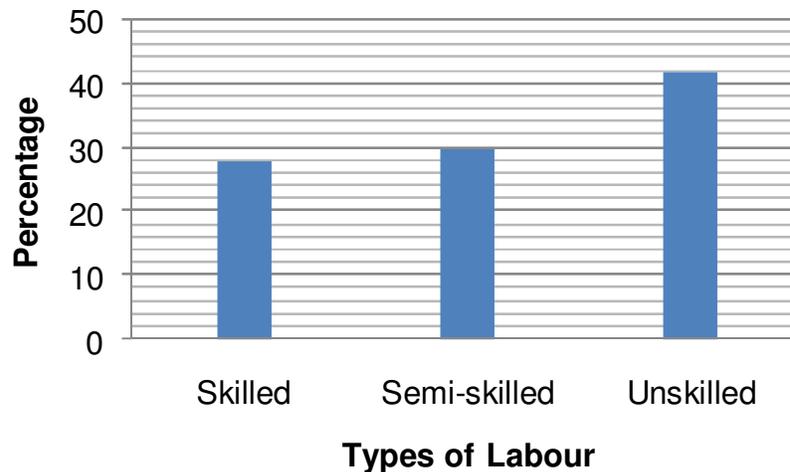
RESULTS

Research objective one: To study labour training and motivation in HRD practices in construction firms in Mashhad, Iran

Regarding the percentage of different types of labour in construction projects per day, skilled labour formed 28% of workers, who were hired by the contractor firms (Figure 2). In contrast, 42% of the workforce was unskilled and 30% were semi-skilled. These results are quite similar to the previous research outcome that was conducted by Tabassi and Bakar (2009). There also revealed that many of workers who were involved in construction projects in Mashhad were unskilled. In addition, the findings show that nearly 56% of the companies had specific training courses and programs for their labour. In contrast, almost 44% of the respondents declared that there were no well-defined training courses or programs in their companies. They were also asking for the type of training programs that applied in regard to developing employees. The result indicates that their most common methods of training were on-the-job training (34.4%), training the staff by supervisors during the construction (25%), sending the trainees to general construction industries training centres (12.5%), sending the trainees to private construction industries training centres (12.5%) and training courses by the company training centre (6.3%). Also, the respondents did not utilize distance education as a method of training in their companies' development policies. On the other hand, nearly 40% of the firms with

Table 2. Ranking of the contractor companies according to the MPO regulation, criteria, and formula.

Grade	Maximum contract price (million Rials)	Minimum essential qualifications scores			
		Personal resources	Tract record, performance and experiences	Financial assets	Competency (S)
1	40,000	3,000	5,000	10,000	7,400
2	25,000	1,800	2,500	6,000	4,290
3	10,000	1,200	1,000	3,500	2,410
4	5,000	750	500	1,600	1,175
5	1,500	375	---	---	112

**Figure 1.** Percentage of the respondents' responsibilities.**Figure 2.** Type of labour in Mashhad contractor companies.

training programs asserted that more than 5 years the training programs applied in their companies. In contrast, 27.8% less than one year, 27.8% between 1 to 3 years and 5.6% of the companies conducted the training practices between 3 to 5 years.

Regarding the level of employees' obligation for attending to the training programs, nearly 70% of the companies with training programs mandated the staff from limited to moderate extent and just 30% obliged them to a considerable extent. An estimation of the

amount of spending USD on training programs for each individual by the companies, which had managed training practices, shows in Figure 3. According to the Figure 3, most of the respondents, nearly 70%, assigned less than 1000 USD for training and development of the staff and workforces per year. This can also emphasize on low consideration of the companies in the survey in developing human capital.

According to the respondents who did not have any integrated training programs, their companies faced with many problems and barriers for employing effective training policies. Some of their barriers were: variations in the number, size and type of projects undertaken by the companies, high expenses of construction training courses, dynamic and complex environment of the industry, financial problems faced by the companies, short term contract of most of the workers, large number and various types of construction learning points, low knowledge and lack of incentive among the workers for training, little attention of client to the importance of skilled labour in projects and time-consuming.

In order to motivate the staff and workforces, the following incentives were applied by the firms: awards (34.4%), promotions (28.1%), financial incentives (18.8%) and paid time off (6.3%). No other motivator and incentives were applied by the companies. Accordingly, awards and promotions were utilized as the most effective training motivators for inspiring the staff and workforces by the respondents of the survey.

Research objective two: To study the relationship between training and motivation practices with teamwork improvement of the firms.

According to the respondents' declarations, 75% of the companies in this survey were faced with damages by entrusting the works to inexperienced workforces. Sort of those damages were low quality of construction (65.6%), delay (59.4%) and extra costs (37.5%). As a result, most of the firms faced with more than one of these harms in their undertaken projects. In contrast, in 25% of the companies, which were not faced with the asserted damages, a relationship between training and motivation practices with teamwork improvements was observed.

As mentioned earlier, a powerful HRD system is the most valuable asset of any organization in this century, and an enterprise's productivity is closely correlated with its HR managerial and developmental policies. On the other hand, the literatures show that in the coming years, HRs are becoming the most important asset of an organization if they are adequately nurtured, educated and developed. In addition, the dynamic external environments within which many businesses currently operate requires that they develop a capacity for training and learning faster than competitors, to find solutions to novel and complex problems, and to enhance the

quantity of what they do through effective training and motivation methods.

Figure 4 illustrates the research model, which was generated and evaluated by the study. According to Figure 4, variables of the study were: teamwork improvement as a dependent variable (DV), training factors as independent variables (IV) and motivation parameters were moderating (MD) the relationship between training and teamwork improvement. Training factors included of perceived training as an important part of employee development by the companies, a system for developing HR asset and developing learning environment. The motivation factors embodied of training assignment, perceived importance of training, hygiene factors and motivating environment. Hygiene factors were the existence or absence of job satisfiers, such as working conditions, pay or salary, company policies and interpersonal relationships.

To test the moderator effect on the relationship between ID and DV a Hierarchical Regression Analysis was used to determine what proportion of the variance of a particular variable was explained by other variables when these variables were entered into the regression analysis in a certain order. Regression analysis of the model was done through the AMOS software. The outputs generated from the analyses show that the R^2 for our model was equal to 0.54 and Significant value was 0.002 (Significant Value <0.05). Therefore, the model as a whole explains nearly 54% of the variance in teamwork improvement (Figure 5). According to Pallant (2005); Tabachnick and Fidell (2001), R^2 equals to 0.54 is a respectable result. Thus, teamwork improvement had shown a strong relationship with IVs and moderating variables in the model. In other words, motivation parameters such as training assignment, perceived importance of training, hygiene factors and motivating environment had strong effects on employees' training practices that applied by the companies and caused an improvement on teamwork activities in the respondents' firms. Therefore, the companies that applied these motivators made an inspiration for their employees for effective training and high improvement in their teamwork activities were observed. As a result, construction companies by applying these training policies as well as the motivators for their staff and workforces can improve their teamwork activities and obtain better performances.

DISCUSSION

Regarding the previous sections, training and motivation have been seen as the two main cores of HRD practices by practitioners. The companies' productivity is strongly correlated with policies and practices in training and motivating their staff and workforce. As a result of the study, lack of expert workforce is an essential problem that most of the construction projects in this survey have

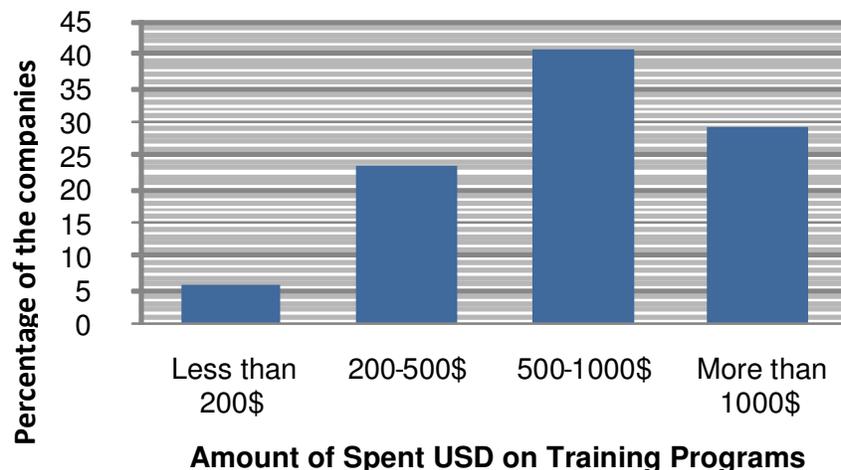


Figure 3. An estimation of the amount of spent USD on training programs for each individual by the companies.

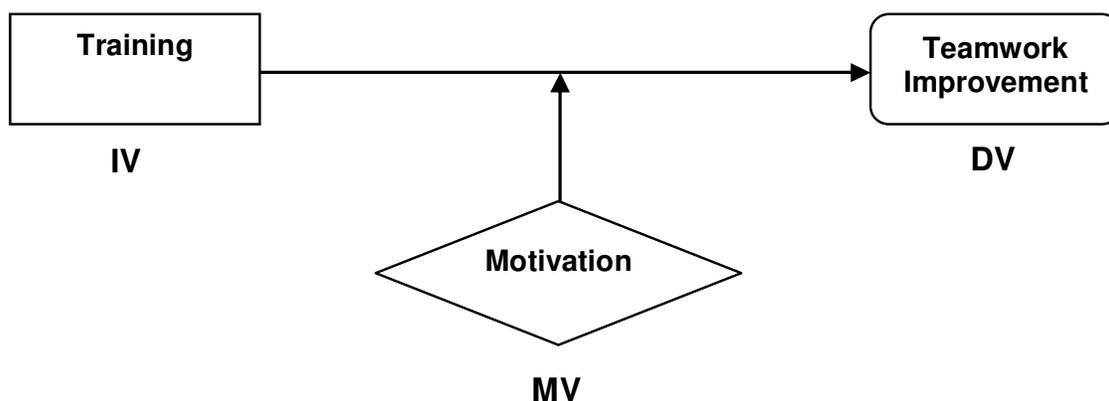


Figure 4. Theoretical relationship of Training (IV) and Motivation (MV) with Teamwork Improvement (DV).

been faced with it. As mentioned earlier, most of the construction companies confronted with some barriers to training and motivating their employees. On the other hand, the respondents point to the government as the main responsible to solve these shortfalls. Of course, the government plays an important role in solving the barriers but some of the mentioned deficiencies can be solved or reduced by the companies and managers as well. For instance, the companies can apply a proper HRD system in order to motivate and develop their employees. Incentives such as workers' participation, recognition, awards, promotions, financial incentives and paid time off should be utilized in order to motivate employees for training. Besides, some methods of training such as on and off the job training, and distance education can be used for increasing the level of knowledge and expertise in workforces.

It is also revealed that effective training and motivation practices are the important factors in implementing HRD in the construction industry. In line with HRD practices,

managers also need to develop ways to measure teamwork performance for their companies. As indicated by Nesan and Holt (1999), a system of "performance measures" is needed in order to monitor improvements or lack of improvements among construction teams. Therefore, a system for teamwork measurement is essential for every construction firms. According to the result of the study, teamwork improvement expresses a strong relationship with training and motivation practices, which were applied by the respondent companies, in HRD organization.

To sum up, the research reveals that most of the contractor firms in Mashhad faced with low quality construction, extra cost and delay in their projects. In contrast, the companies that applied the training and motivation practices of the study improved their teamwork activities, obtained better performances and faced with less asserted problems and damages in their projects. In addition, the study shows that teamwork improvement has a strong relation with training methods as well as

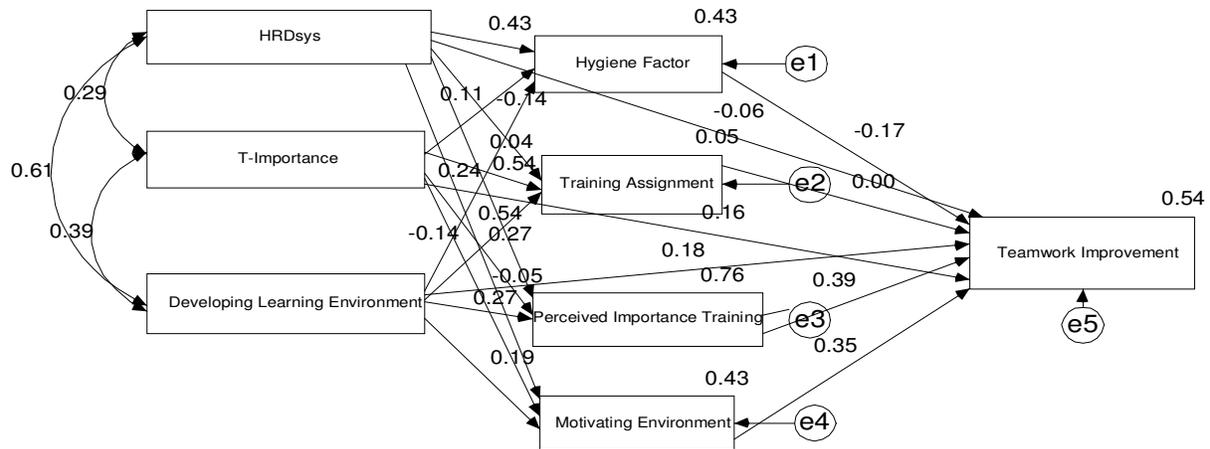


Figure 5. Model generated by AMOS for assessing the relationships between IV, MV and DV.

motivating employees for training and development in HRD practices. Consequently, companies by integrating these training and motivation practices can improve their performances and decrease the shortfalls in regard of construction quality, cost and delay in their projects. Finally, it seems that the government can play an important role in increasing the quality of construction projects by improving the training methods and prepare facilities for labour to encourage them to attend the training courses. Government by increasing the social security, pay towards of labour costs for living, forcing the companies to use the workers with certification of fitness of occupation, and develop social insurance can facilitate training and motivate construction workers.

Conclusion

Mashhad, the scope of the study, is the second largest city of Iran in terms of population, area and construction projects. It has many construction projects and consequently, a large number of engineers, managers and construction workforces are actively entailed in its projects. The survey involved sending of questionnaires to assorted number of contractor companies with Grade One, Grade Two and Grade Three in Mashhad. The research found that 42% of workforces in the respondents' firms were unskilled. In addition, most of the companies encountered with damages by entrusting the works to inexperienced workers.

The study revealed that workers' participation, recognition, awards, promotions, financial incentives and paid time off are profitable methods of motivating the employees for training. Perceived training as an important part of employee development by the companies, a system for developing HR asset and developing learning environment, besides of, on and off the job training and distance education are recommended as methods of training and development in HRD organizations. Also, the

result showed that teamwork improvement had a strong relation with training and motivation in HRD practices. Lastly, the study makes the government, companies and managers aware of the low construction quality, delay, extra cost and lack of experienced workforces in construction projects and lead them to apply proper policies to prevent probable damages.

RESEARCH LIMITATIONS AND FUTURE STUDY

The current study has some limitations that offer an agenda for future research. As the research has been confined to quantitative techniques, a large-scale follow-up survey would be useful to find out which of the identified training and motivation methods have the proposed connection with construction workers. We found a range of training and motivation methods in HRD practices that play a role, but which methods are most relevant is not yet clear. Future research should try to address how companies and governments adapt to and shape the environmental and organizational settings in such a way that the context optimally stimulates workers motivation and participation in training courses and effects on quality performance of construction. Also, future research should be conducted in other regions and a comparison can be made by the results of the current research.

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Full Length Research Paper

Potential energy savings in compressed air systems in Serbia

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Compressed air systems (CASs), as one of the most important energy carriers in the industry, are targeted as a field full of possibilities for energy savings. Average electricity consumption of the CASs in Serbia is estimated to be 8% of the overall electricity consumption in the industry. This data was obtained based on the share of the amount of electricity consumed in the production of compressed air in the overall energy electrical energy consumption in the polled companies. Although this percentage is low compared to the values reported for some other countries, this does not mean that the CASs in Serbia are more efficient. This low percentage is a consequence of the low price and high energy intensity of electricity in Serbia, so that the portion of wasted energy is much higher than the average in developed countries. The present paper describes the state of CASs in Serbia and relates it to that in some other countries, highlighting some of the most frequent and most significant issues. Besides, the recommendations are given on potential savings, which are estimated to amount to at least € 8.07 million per year. To achieve this, it would be necessary to raise the awareness of the employees of the importance of saving energy and implement a national program of energy efficiency in CASs.

Key words: Compressed air system optimization; energy efficiency; energy consumption.

INTRODUCTION

According to the Kyoto Protocol from 1997, the EU has to reduce greenhouse gas emission by 8% below the level from 1990 by the 2008-2012 periods. To achieve these reductions, substantial efforts have to be undertaken in all branches of human enterprise. Serbia, as a European country, has to contribute to the overall efforts to decrease greenhouse gas emission, and therefore, the Serbian Government has to work out and implement an appropriate energy policy. One of the important industry utilities that have to be encompassed by this energy policy is compressed air systems (CASs).

The application of compressed air has had a growing trend due to its easy and safe generation, manipulation, and usage. In previous years, the research efforts in this domain were concentrated on the CASs development and application aimed at boosting the productivity regardless of the energy consumption. With increased

awareness of the energy costs as well as the effects of greenhouse gas emission, the attention has been recently placed on the energy efficient use of compressed air.

The experience gained in numerous CAS optimization projects, as well as the opinions of the experts in the field, indicated that many industrial systems are missing the chance to improve energy savings with the relatively low costs of projects for increasing energy efficiency (Yuan et al., 2006).

Energy saving measures in CASs that have been identified in the course of energy audits in the industrial small and medium enterprises may yield an average energy saving of nearly 15%, with a payback of two years, the energy saving potential in some of them amounting from 30% up to even 60% (USDOE, 2001). The basis for all decisions concerning energy efficiency of the existing CASs is the understanding of the way of their functioning and existence of appropriate data. In that sense, it would be necessary to make measurements of consumed electricity of compressors, airflow, system leakage and pressure drop in the system.

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A number of common technical measures can improve energy efficiency of CASs, some of the most important being (Al-Mansour et al., 2003):

1. Reduction in waste air due to inadequate maintenance and leaks,
2. Improving control systems,
3. Reduction of pressure drops,
4. Better maintenance and operation,
5. Building of an air valve sub-system for separation.

Besides energy savings, increasing energy efficiency of CASs may ensure other significant benefits for the enterprise. Energy saving measures implies a high monitoring level of CASs and appropriate maintenance. That leads to decreased breakdowns of production equipment, avoiding of the loss of raw materials or other inputs, longer life cycle of pneumatic devices and higher reliability of CASs. Often, these benefits are more valuable than the energy savings.

This paper is concerned with the identification of the current state of energy efficiency in the production and usage of compressed air in the industry of Serbia and possibilities for improvements that would yield the corresponding energy saving. In order to compare the findings with those for some other countries, first a brief outline of the state of CASs in the USA, European Union, China, and Vietnam were given. The USA was taken because of its leading position in the industry; European Union because Serbia is part of Europe; China as an example of the fast-growing industry, and Vietnam as a typical example of a developing country.

ENERGY EFFICIENCY OF CASS

USA

A key finding of a survey carried out within the "Motor Challenge Program" (MCP), launched in 1993, was that 20% of all US electricity was used to operate industrial motor-driven systems, a large portion of this being associated with pumps, fans and blowers, and air compressor systems.

The reported potential savings were over 1 TWh of electricity or USD 3 billion per year, with the existing and new technology by 2010 (or 10% of the total energy cost of industrial motor-driven systems). System improvement opportunities were recognized in motor sizing and proper matching to load, improvements in the system layout, updating and well-maintaining controls, improving operation and maintenance, and use of adjustable speed drives (McKane et al., 1997).

The MCP was followed by the project "Compressed Air Challenge" of the US Department of Energy (USDOE, 2001). One of the most significant findings of this project was that the CASs energy consumption in a typical

manufacturing facility could be reduced by 17% through appropriate measures, with a payback of 3 years or less. Apart from these energy savings, improvements to the energy efficiency of CASs could also yield some other important benefits to the end users, such as reliable production, less rejects, higher quality, etc.

European Union

The European Commission launched the "Motor Challenge Program" with the aim to overcome energy efficiency barriers. Of the total electricity consumption in the EU-15 in 2000, of the overall 2,574 billion kWh, 951 billion kWh were used in the industry. Of this, 614 billion kWh, or 65%, was consumed by motor-driven systems. It was estimated that the potential saving could be 181 billion kWh, (29%), or seven percent of the overall electricity consumption (De Keulenaer et al., 2004).

According to the study "Compressed Air Systems in European Union" (Radgen and Blaustein, 2001), the EU-15 was spending 10% of the total electricity consumed in the industry for the production of compressed air. The most important potential energy savings are related to the system installation and renewal (the overall system design, improvement of drives, use of sophisticated control systems, recovering heat waste, improved cooling, drying and filtering, reducing frictional pressure losses, etc.) and system operation and maintenance (reducing air leaks, more frequent filter replacement, etc.). The percentages of potential saving varied from country to country. For instance, Germany spent seven percent, United Kingdom 10%, Italy, France and the rest of EU 11% (Radgen and Blaustein, 2001). Details on potential energy savings can be found in the corresponding references: for Germany in (Radgen, 2004) and (Radgen, 2003), for Switzerland in (Gloor, 2000), for Sweden in (Henning, 2005), and for Austria in (Kulterer and Weberstorfer, 2007).

China

The electricity consumption of CASs in Chinese enterprises goes from 10% up to 40% (Li et al., 2008) of the total industrial electricity consumed. According to (Li et al., 2008), the most widely used compressors in China are reciprocating compressors, often several decades old.

To meet increased compressed air demands, many enterprises have undertaken retrofits of their CASs, yielding increased compressor capacity, improved system piping, etc.

The most frequently implemented energy saving measures are: purchasing rotary screw compressors, application of variable speed drives and changes to the piping system to allow centralized production of

compressed air, etc.

Vietnam

A key element of the "National program on energy conservation and efficiency in the period of 2006–2015" is the energy efficiency audit. As an example, the audit of a footwear factory (Ming, 2009) showed that the CAS operation was not optimized. Many air compressors were working for artificial demands. Another important issue was the air leakage, wasting over 65% of the compressed air. Because of all this, the overall energy efficiency of the CAS was less than five percent. To overcome this it was suggested to invest about USD 84,000 in the first year and USD 41,400 in each of the forthcoming years, which would help the factory to save USD 195,700 each year.

METHODOLOGY

The Serbian Ministry of Science and Technological Development initiated the "National Program of Energy Efficiency", with many subprojects, one of them being "Increasing Energy Efficiency of Compressed Air Systems in the Industry", within which this study was carried out.

In order to acquire information about the current energy efficiency of CASs in Serbian industry a survey was carried out during 2006. The objective was to help the systems' operators to analyze and optimize the actual state of their CASs, define priorities for energy saving and demonstrate the company's saving potential, not only in a qualitative but also in a quantitative way. The study encompassed companies from all branches of the industry, with the emphasis on the air pressure up to 10 bars. The choice of the companies was made following the selection pattern of the USA (USDOE, 2001) and German (Radgen, 2003) studies. According to the Serbian Business Registers Agency, the number of production enterprises in Serbia in 2009 was 40,000 (SBRA, 2009), the number of those with a CAS being unknown. The survey included 52 such companies, four from each industry group. Exceptions were the food and beverage industries, represented by ten and nine enterprises, which is in proportion to the number of companies from these branches and their participation in the Serbian market. For instrument industry group, we chose only two companies, because this field is rather undeveloped. Of course, the data would be more reliable if more companies were included, but this study should not be seen as the final and full description of CASs and possibilities of their improvements, but rather as a pilot project dealing with the current state of CASs in Serbia.

The data were collected through a questionnaire specially designed for this study. The questionnaire was provided to the companies by post, e-mail, or in direct contact. The questionnaire had the following parts:

1. General information about company
2. General information about the CAS
3. Applied CAS control methods
4. Maintenance of CAS
5. CAS audit.

Special attention was paid to:

1. User's specifications

2. Specifications of the CAS
3. actions carried out in CAS control and maintenance
4. ACTIONS for increasing energy efficiency of the CAS
5. Problems and limitations that occurred in the implementation of these actions.

As a preparation for this study, walkthrough audits in a dozen of Serbian companies have been done, while paying special attention to the compressor rooms, distribution systems, end-uses of compressed air and leakage rate.

RESULTS AND DISCUSSION

Compressors

The majority of the companies polled in the survey (72%) have compressors with motor power up to 500 kW (Table 1), and these data approximately match those for highly developed countries (USDOE, 2001). Nearly half of the companies have medium-size compressors, which can be easily adjusted to different demands, for example, with the introduction of variable frequency drives. It can be noticed that the largest percentage of consumption of electricity for compressed air generation in comparison with the overall electricity consumption is in the primary metal industry and fabricated metal industry. Electricity consumption for compressed air production is significantly below the average only in the textile industry.

The column "unknown" indicates a relatively bad situation in some of the companies. The people from maintenance department and other technical services do not know even the power rating of their compressors because they are old, technical documentation is not available and technical specifications of motors are lost.

In contrast to the situation in Europe, where screw compressors are the most common (Radgen and Blaustein, 2001), the compressors in the CASs of the Serbian industry are mainly reciprocating compressors. Namely, assuming that the polling sample is representative enough, it can be said that these compressors make more than 60% (single-acting 40.3% and double-acting 20.8%), whereas rotary screw compressors make 37.6% of the total number of compressors.

One of the ways of increasing energy efficiency of the CASs is to replace reciprocating single-acting compressors with rotary screw compressors. Although the former compressors are efficient in the applications up to 25 kW, in the polled companies they are used in the applications that require even seven times higher power. If the old reciprocating single-acting compressors in the polled companies were replaced with rotary screw compressors, which are by 20% more efficient (Prator, 1998; Norgren, 1999; Ambrosino, 2008), it would be possible to save about 3.23 GWh/year (Table 2). If this data is related to the overall industrial electricity consumption in Serbia it comes out that the potential saving in CASs could be 2.8% or 15.20 GWh (in 2008).

Considerable attention should be paid to the

Table 1. Installed motor power and number of compressors in the polled companies.

Industry group	Installed motor power in CASs (kWh)	Participation of CASs in total electric consumption (%)	Installed motor power of air compressors (kW)				
			<100	100-499	500-999	>1,000	unknown
Primary metal industry	7,890	50		1		2	
Beverage industry	4,490	-		2	3	2	
Rubber and plastic products	3,204	-	1		1	1	
Chemical industry	1,995	-	1	2		1	1
Food industry	1,546	-		7			
Machine and equipment industry	1,230	-		2	1		
Stone, clay and glass products	955	5-15		2	1		
Petroleum and coal products	644	5-20	2		1		
Fabricated metal products	479	20-50	1	2			
Instruments	420	10-30		2			
Paper and allied products	287	-	1	1			
Textile industry	182	2-10	1	1			
Press and publishing	171	-	1	1			
Furniture	120	-	2				
Electronic and other electric equipment	83	5-40	2				2
Leather and leather products	-	-	1				2
Number of compressors (%)			24	43	13	11	9
Total	23,696						

procedures of compressor control and maintenance, especially because 53% of users have four or more compressors in their compressor rooms. However, the findings do not comply with this requirement. This study indicated that the users' awareness of the benefits of latest compressor control systems is on a concernedly low level. (Table 3) gives compressor control methods that are in use in Serbia. As can be seen, start/stop is the most common control method, although it does not allow to maintain a stable system flow and pressure in an energy efficient way. The more efficient method, frequency regulation, is used in only 20.4% companies. However, in about 18% of polled companies the

introduction of this sophisticated method of compressor control is not economically justified, because they are of relatively low power (2 - 7.5 kW). In the rest 61.2% companies, which use 92.4% electricity in the polled sample, the start/stop regulation could be replaced by frequency regulation, and thus save 10% (Wissink, 2007) of the total electricity consumed in the CASs, that is 54.9 GWh (for 2008) (Table 4).

In order to use and control compressors in a best way it is very important to understand the facility's unique air usage profile, which includes the percentage of the time that the motor will be operating in various load conditions, and also how the motor has been matched to the

Table 2. Potential savings in the polled companies achievable by replacing reciprocating single-acting compressors with rotary screw compressors.

Industry segment	Installed motor power (kW)	Electricity consumption (kWh/year)	Motor power where replacement can be done (kW)	Electricity consumption where saving can be made (kWh/year)	20% savings (kWh/year)
Food Industry	1,546	10,887,136	270	1,617,408	323,482
Beverage Industry	4,491	59,014,904	1,326	7,971,704	1,594,341
Fabricated metal products	509	1,998,880	165	343,200	68,640
Machine and equipment industry	1,270	5,861,960	260	3,569,280	713,856
Instruments	420	760,500	420	760,500	152,100
Electronic and other electric equipment	83	172,640	72	149,760	29,952
Rubber and plastic	3,204	30,698,304	74	646,464	129,293
Stone, clay and glass products	963	7,317,440	148	1,077,440	215,488
Total		116,711,764		16,135,756	3,227,151

Table 3. Compressor control methods.

Control method	Company (%)
Start/Stop	71
Frequency regulation	20
Inlet modulation	16
Dual control	4
Variable displacement	2

compressor power requirement (Talbot, 1992). By applying new control methods and adjusting them to the demand changes by shift or time of the day, significant energy savings could be achieved. In simple words, there is a high potential for upgrading compressors' functioning in the polled companies.

Distribution system

In the majority of polled companies, the oldest segment of the CAS is the distribution (piping) system. Distribution systems are one of the least understood, but at the same time, an essential element of CASs. Usually, and this is especially true for old factories, the piping systems are places where so much energy is lost and so much maintenance is incurred.

The distribution system can be inappropriate for the new demands in production and should be adjusted by

diameter and kind of material to new expansions in the production. The survey showed that steel pipes are installed in 82% of Serbian CASs. New materials for piping systems, like plastic and copper, are in use in only ten and three percent, respectively, of companies. It can be concluded that the distribution systems are, in average, aged and often neglected. In addition, this indicates that the employees and management are not sufficiently informed about the advantages of new materials for pipes, or they do not have finances to invest in retrofitting of the distribution system. However, the data collected did not allow us to make a quantitative assessment of the potential savings.

Maintenance

In the assessment procedure, the users were asked to list regular maintenance activities that they performed, and the results are presented in (Table 5).

As can be judged from their answers, all companies perform certain maintenance activities. These data can mislead us to believe that the companies pay due attention to their CASs. However, if these data are related to the fact that 67% of polled users said that they carry out maintenance activities just in case of malfunctions, it can be easily concluded that there is no detailed, or even any, plan for preventive maintenance. Similar practice has also been observed in some other countries (USDOE, 2001).

Table 4. Potential savings achievable by introducing frequency regulation of compressors.

Compressor control method	Companies (%)	Installed motor power (kW)	Electricity consumption per year (kWh)	Electricity consumption per year (%)	Savings/year (%)	Savings/year (kWh)
Frequency regulation	20.4	3,162	13,288,288			
Frequency regulation not applicable	18.4	567	2,301,000	7.6		
Frequency regulation applicable	61.2	20,333	189,307,716	92.4	10	18,930,772
Total						18,930,772

Table 5. Regularly performed maintenance activities.

Maintenance activity	Company (%)
Check cooling water quality, replace cooling system	47
Check belts for wear and replace	53
Clean air line filters	65
Verify operating temperature per manufacturer specification	71
Check pressure regulators	71
Check lubricant level and filter	78
Clean condensate drains	86
Check for system leaks and their fixing	88
Clean or replace inlet air filter cartridges	94
Other	10

CAS management

One of the questions in the poll dealt with the users' objectives in managing of CASs. The answers mentioned continuous system operation, adequate supply of air and providing proper quality of compressed air as the most important tasks for the reliable functioning of these systems. Contrary to the stated objectives, the real situation was quite different. More than 20% of the companies said that they had problems with their CASs in the past twelve months, the presence of moisture or oil being mentioned most frequently. Namely, the percentages of the companies that stated the presence of water (82%), oil or oil mist (35%) in compressed air are extremely high, exceeding the acceptable level. In comparison with data from the USA study (USDOE, 2001), almost three times more companies in Serbia have had that problem. An explanation for high water and oil content in Serbian CASs may be the fact that a majority of compressors are of reciprocating type, without dryers. The situation in Western European countries is opposite, the refrigeration dryers are standard, and the moisture problem is managed by proper sizing of the dryers and correct operation. Hence, additional efforts should be made to procure appropriate dryers and filters.

As far as the responsibility for CAS management is

concerned, in 33% of companies the managers of maintenance departments are responsible for managing CAS; in 18% the responsibility is on field engineers, and in the rest of companies this is the duty of some other employees. However, the responsibility for managing CAS is usually shared among the managers of several departments: production manager, maintenance manager, financial manager, etc. This is the reason why it is so complicated to make and apply in practice any decision concerning the priorities in managing of CASs. Smaller plants are less likely to be able to afford a full- or part-time energy or productivity manager on site, or conduct a comprehensive energy and productivity audit to identify and implement saving opportunities (Alhourani and Saxena, 2009).

Investments

More than 67% of companies have the CASs that are 10 or more years old (either compressor or distribution system), which is a very disturbing fact. In 87% of factories, the equipment is older than five years, which indicates the lack of investment in CASs due to the overall bad situation in the economy of Serbia.

More than one half (51%) of the polled users have had

some investments in certain parts of their CASs aimed at improving the energy efficiency; a great majority of those that invested (88%) bought new compressors. After that come the procurements of filters and dryers, with 64% and 52% respectively. More than one third retrofitted their distribution systems because they were dilapidated and leakages were very high. Only 20% of the users invested in compressor control systems. As the main reasons for the absence of capital investments, the polled companies mentioned the lack of financial resources (48%), unawareness of the importance of CASs for proper manufacturing, or lack of understanding of the benefits that the investment would bring to the factory.

A serious problem represents the fact that 49% of the companies did not have any investment in their CASs since they started to work. In some cases, it is more than thirty or forty years. Still, the majority of the polled users invested in their compressor facilities, but those investments were more than eight years ago. Big investments, such as retrofitting of the entire system, are rather rare (only 24%). Other investments are mostly individual and targeted on filters, dryers, and pressure regulators.

Methods applied to increase the energy efficiency of CASs

One of the questions was related to the studies of energy efficiency. Only one of the 52 companies undertook the energy efficiency study of its CAS.

It encompassed the evaluation of exploitation of compressed air, identification of unnecessary and inappropriate usage of compressed air, measuring of pressure drop, and recommendations for enhancement of the CAS efficiency.

The main reason for not implementing measures for increasing energy efficiency was the lack of money, 33% stated this as the main problem; 27% of users mentioned that they have other problems and priorities concerning production, and therefore, they did not have time to pay attention to CAS. Nearly one third considered that they did not need to apply measures for increasing energy efficiency. Other barriers mentioned were the lack of communication and shared responsibility between the maintenance department (which is typically responsible for the system operation) and plant engineers (who are focused on meeting the needs of production departments). In 13% of cases, the management staff were not interested in increasing efficiency of CASs. Very common problems are the lack of knowledge and skilled employees as well as the lack of measuring devices.

The number of procedures applied to increase energy efficiency is quite small. There is no correlation between installed power of compressors in the plant and the number of activities implemented to increase the energy efficiency. Large systems are naturally large of energy, and there are a lot of possibilities and situations where compressed air can be saved or used in a more

a more appropriate manner. On the other hand, large systems are usually carefully planned and installed, and, if the design is good, many options for energy efficiency have already been implemented in the system.

Identification and repair of leaks in the air distribution system and at the end-use tools can reduce the system's energy consumption. This alone can make 42% of the overall savings potential (Radgen and Blaustein, 2001). Prevention of air leaks is an essential measure of energy saving. For example, it was reported that in the New Zealand companies the 50-70% of savings were related to demand side (Neale and Kamp, 2009).

Considering air leaks, the prevention activities have been conducted in the 63% of companies polled; 97% of them consistently checked for the leak near compressors and dryers; 90% always checked valves, shut-off valves, drains, etc; 81% checked joints for leaks; by-pass valves checked 65%, and 55% checked for leakage at regulators and tools. These are surprisingly high percentages for leak detection. This only can confirm that there are huge problems with leakages in Serbian CASs. Our estimation is that leakage rate varies between 20% and 40% of the total air usage. People, who are working there, are aware of the fact that air leakages cause them troubles in the functioning of the system. Hence, in many cases they try to provide faultless functioning of their CASs.

In a majority of companies, the in house employees are in charge of leak prevention activities; certified persons are engaged to do leak prevention program only in 35% of companies.

Potential savings

Based on data of the Electric Power Industry of Serbia (EPS, 2009a), the amount of electricity consumed in Serbia in 2009 was 27,639 GWh. Figure 1a, shows that nearly 7,000 GWh (26%) were used in the industry (Neale and Kamp, 2009), the breakdown by sectors being presented in Figure 1b (RZS, 2009). It is evident that the largest proportions are related to the metal industry, chemical industry, food and beverage industry, etc., in which compressed air is strongly important for proper functioning. Industrial CASs installed in Serbia consume about 8% of the electricity used by industry (Table 6). This data was obtained based on the share of the electricity consumed in the production of compressed air in the overall energy electrical energy consumption in the polled companies. Although this percentage is low compared to the values reported for some other countries (Radgen and Blaustein, 2001; Radgen, 2004; Radgen, 2003), this does not mean that the CASs in Serbia are more efficient. This low consumption percentage is a consequence of the inefficient electricity utilization in the industry, the value of energy intensity being three times higher than in the developed European countries (USEIA, 2006). Besides, the price of electricity in Serbia is relatively low, so that no appropriate attention is given to its

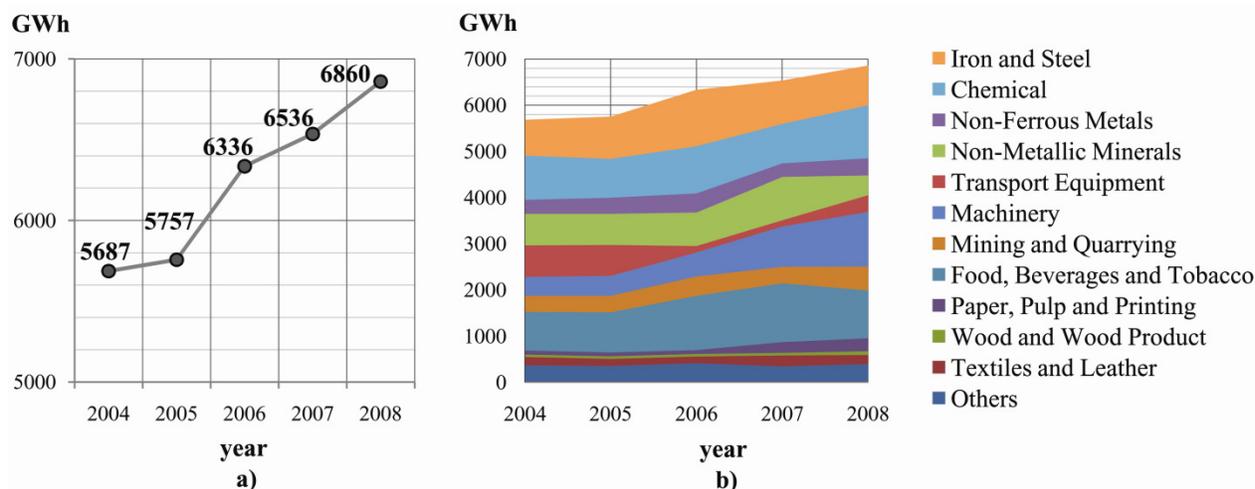


Figure 1. Industrial electricity consumption in Serbia: a) overall industry, b) breakdown by the sectors.

Table 6. Calculated savings.

Variable	Value	
Year	2006	2008
Electricity consumption in the industry (GWh)	6,336	6,860
Electricity consumption for compressed air production (GWh)	506.8	548.8
Electricity consumption in CASs of the overall industry consumption (%)	8	8
Electricity consumption in the polled companies (GWh)	116.7	
Energy saving measure	Savings in CASs (%)	
Replacement of reciprocating single-acting with rotary screw compressors	2.8	
Frequency regulation instead of start/stop regulation	10	
Reducing air leaks	24	
	36.8	
Total		
Savings (GWh)	201.8	
Savings (€)	8,070,666	

economic utilization. There is a high potential for increasing energy efficiency of CASs in Serbia. In the sequel, the study will mention some procedures by which substantial savings could be made. All savings are calculated for the year 2006 (when the research was carried out) and extrapolated to the year 2008 (the last year for which we have pertinent statistical data) in accordance with the trend of energy consumption in the industry (Figure 1a and b) (MEM, 2008; RZS, 2009).

As already mentioned (Table 2), one of possible ways of increasing the energy efficiency of CASs is the replacement of the reciprocating single-acting compressors with rotary screw compressors, which would reduce the CAS energy consumption by about 2.8%. On the other hand, the introduction of frequency regulation would result in the saving of 10% (Wissink, 2007) (Table

4). If this is combined with the potential saving that could be achieved by eliminating air leak in CASs, which is in average 30%, and if this mode of saving is applicable in about 80% of companies (Radgen and Blaustein, 2001), the additional reduction would be 24%. This would result in the potential saving of 36.8% of the total energy consumed by CASs. With the current price, which is regulated by the government, of approximately 0.04 €/kWh (EPS, 2009b), Serbia could save at least € 8.07 million every year (Table 6).

By taking into account the other possibilities of optimization of CAS operation, such as recovering waste heat, improved cooling, drying and filtering, reducing frictional pressure losses, optimization of end-use losses, etc., it can be estimated that the above saving of 36.8% might well exceed 40% of the total electricity consumed

by the CASs in Serbia.

CONCLUSIONS AND RECOMMENDATIONS

A general conclusion that can be drawn from studying the current state of CASs in Serbia is that there is a lot of room for improvement in these systems. The potential measures that could be undertaken may be related to the technical aspects of their proper functioning and readiness of the company's policy-makers to pay due attention to this issue, which is in some cases of the essential importance for the function of the company as a whole. However, a prerequisite for this is to raise the awareness of all the people involved of the importance of energy utilization optimization and of all the benefits that can be thus achieved. In that sense, it would be desirable to publish the appropriate guides and organize seminars dealing with energy efficiency of CASs, as well as to develop the best practice programs.

The first step in Serbia was already made by publishing the "Guide for increasing energy efficiency of compressed air systems" (Šešlija, 2008).

Based on the findings of this study we can recommend some general measures to be undertaken with the aim to improve the energy efficiency in CASs in the industry of Serbia:

1. Reducing air leaks
2. Replacement of old compressor unit with new, more energy efficient ones
3. Replacement of old, devastated distribution systems with the appropriately designed new distribution system,
4. Improvement of compressor control systems by introducing frequency regulated drives and multiple compressor control systems
5. Recovering of waste heat.

In addition, it is highly recommended to introduce a position of energy manager, who will be responsible for both producing and using compressed air.

This study demonstrated how some technical and non-technical measures could improve energy efficiency in the Serbian industry, particularly in the CASs, and brings about remarkable savings. Hence, they should be a high national priority.

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Full Length Research Paper

Indigenous female entrepreneurship: Analytical study on access to finance for women entrepreneurs in South Africa

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Research on female entrepreneurship is imperative to create a knowledge base of women's experiences with regards to being financially excluded in South Africa. There is a realisation, however, that, while race has historically been the primary driver of economic disparities in South Africa, other forms of discrimination also prevent certain groups from accessing economic freedom and opportunities. Women, who represent 52% of the South African population, still suffer from historical and cultural prejudice in accessing opportunities, for a number of reasons that are outlined in this study. While access to financial services continues to be largely racially defined in South Africa, the gender gap between men and women does exist, and is likely to grow if special efforts are not undertaken to address the underlying issues now. Black women are the largest single self-employed segment of the population; a fact that is not reflected in the current industry targets for business activity. This paper examines the extent to which financial service providers in the country were sufficiently aware of the challenges facing women entrepreneurs in South Africa.

Key words: Female entrepreneurs, gender inequality, entrepreneurial motivation.

INTRODUCTION

Historically, the financial markets have always been gender blind, thus becoming the major obstacle for women to start, grow and strengthen their enterprises (Thabethe, 2006). In the past, many black women in South Africa often saw themselves as third- or even fourth-class citizens, and doubly disadvantaged because they were both black and women. Some people (not black women themselves) may say that they are now doubly privileged in times of affirmative action, more so as they can be double-counted, if a quota system for the "disadvantaged" is instituted.

Even in the worst times, there were some black women who managed to turn the "double negative" into a positive

factor, both in South Africa and elsewhere (Prekel, 1989). For the fact that they were both black and women (and thus "twice-removed"), many white men in power positions felt less threatened by them than by either white women or black men.

Thus, some of them were "allowed" to get ahead quietly, earn the respect of their colleagues, and prove themselves and their abilities. Yet, if affirmative action was to be implemented fully, it will take many decades before the effects of centuries of discrimination against both women and people of colour will be eliminated, particularly, in terms of venturing into business.

Background

It is quite true that race has historically been identified as the primary driver of economic inequality in South Africa.

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However, other forms of disparity as well prevent certain groups, such as women from accessing economic freedom and opportunity. Although they represent 52% of the South African population, women still suffer from historical and cultural disadvantages in terms of accessing opportunities, for a number of reasons. For example, risk taking among female entrepreneurs is based on a number of factors, namely financial risk, social and personal risks.

In concordance, Mitchell (2004) posits that besides the risks entrepreneurs face, women face additional problems of being a woman in a male dominated society. This point can be best elucidated by a comment made by one of the respondents in a study of female business owners whom are still treated as second class citizens when dealing with the financial community (Hisrich and Brush, 1984). Owing to the gender division of labour in the private sphere, female entrepreneurs risk their time which could be otherwise devoted for reproductive roles and other activities. The problem confronting women in the business domain is the focal point of this paper.

Research problem

While access to financial services continues to be largely racially defined in South Africa, the gender gap between men and women in terms of entrepreneurial venturing does exist, and is likely to grow if special efforts are not undertaken to address the underlying issues that constrain women from growing their businesses.

Research questions

The earlier stated research problem statement led to the following questions:

1. What are the factors motivating women to start their own business ventures in South Africa?
2. What are the factors that hinder women from growing their business like their male counterparts?
3. What are the barriers faced by women in terms of access to finance for entrepreneurial activities in South Africa?

Research aims and objectives

The following are the research aims and objectives of this paper:

1. To establish factors that motivates women to start their own business ventures in South Africa.
2. To investigate the factors that hinder women from becoming successful in business development and growth.
3. To examine the barriers faced by women in accessing

opportunities due to lack of finance and to make recommendation on ways to overcome those challenges.

LITERATURE ON WOMEN ENTREPRENEURSHIP IN SOUTH AFRICA

According to Lavoie (1985, cited in Rutashobya and Nchimbi, 1999), a female entrepreneur is the “female head of a business who takes the initiative of launching a new venture, accepting the associated risks, the financial, administrative and social responsibilities, and effectively in charge of the day to day activities of the business”. McClelland et al. (2005) define a woman-owned business as one which is at least 51% owned by one or more women or in the case of any publicly-owned business, at least 51% of the stock of which is owned by one or more women. However, creativity and innovation require special skills and competencies which are often lacking amongst women/female entrepreneurs. Green and Cohen (1995, cited in Chell and Baines, 1998) observed that women are defined as innovators not because they are introducing new products, but because they are breaking out of domains traditionally allocated to women. In a similar vein, Forxcroft et al. (2005), Nkai (2005) have observed that women in South Africa are matching men step by step when it comes to starting and running their own businesses. However, Hendricks (2001) posits that the multitude of challenges that face women entrepreneurs in South Africa means that their full economic potential is not fully exploited by both business and government. These challenges have been documented in several articles, including a report compiled by the Africa Project Development Facility. This points out challenges such as access to finance and the cost of finance, access to the market, access to information on support services available and access to training (Dlamini and Motsepe 2004). Mallane (2001) argues that, it is important to put gender equality in its proper perspective: gains by women do not necessarily mean losses for men. On the contrary, communities that have given equal access to women and men in the economic sphere have progressed much faster than those that have denied such access (Hisrich, 1986). It is true that although there has been a general expansion of women’s capabilities, women have on the other hand experienced only limited opportunities despite these changes: women entrepreneurs still face gender-specific constraints at almost every stage of their business operation (Alam et al., 2009).

These constraints includes lack of financial skills, lack of training and market access, role barriers, to name but a few. South Africa’s White Paper on the development of SMMEs stresses the importance of developing female entrepreneurs to ensure equity in income and wealth distribution (O’Neill and Viljoen, 2001). The South African government takes cognizance of the fact that women have been on the side-line of development and have

responded with affirmative action programmes to redress gender imbalances. The participation of women, in particular black women, in the national economy is part of South Africa's Black Economic Empowerment (BEE) strategy to empower the previously disadvantaged groups. Snyder and Tadesse (1991) for example argue that "... women are ... central to the economic as well as the social well-being of societies. Hence, development goals cannot be fully reached without their participation". According to Friedrich et al. (2003), the focus of the South African government is primarily on the development of previously disadvantaged communities. Women entrepreneurs in South Africa have, however, been particularly disadvantaged, as in the past, they owned no property to be used as collateral on loans and in fact, they needed their husbands' permission to enter into financial agreements (Simbwaye, 2002). As a result, many of the informal sector women entrepreneurs do not even have bank accounts, let alone access to external finance. Forxcroft et al. (2002) are of the opinion that, the rate of entrepreneurial activity among men is far higher than that of women. Cultural and social norms are more likely to play a role in these gender differences, particularly since women traditionally have more domestic responsibilities such as child-rearing.

Liberal feminists maintain that women are disadvantaged relative to men owing to over discrimination by, for example, money lenders and/or systematic factors that deprive them of vital resources like business education and experience (Fischer et al., 1993). In a study of female entrepreneurs in South Africa, "more than half of the sample noted that, they only used their own capital to establish their business rather than use borrowed capital" (Erwee, 1987). Watson and Robinson (2003) remarked that "the managed approach to business expansion may result in ventures that are able to out survive those headed by entrepreneurs pursuing more risky, high growth strategies". The house-to-house survey carried out in South Africa supports the aforesaid assertion. Mead and Liedholm (1998) contend that female-headed small medium enterprises (SMEs) were more likely to survive than their male counterparts.

The Department of Trade and Industry (DTI) has growth, the DTI has been running a gender programme since 1998, targeting women, with both an internal and external focus. Informed by both national and international instruments aimed at advancing gender equity, the growth, the DTI has been running a gender programme since 1998, targeting women, with both an internal and external focus. Informed by both national and international instruments aimed at advancing gender equity, the Gender and Women's Empowerment Unit (GWE) is housed within the Enterprise and Industry Development Division of the DTI. The Gender and Woman's Empowerment Unit of the Department of Trade and Industry Gender and Women's Empowerment Unit (GWE) is housed within the Enterprise and Industry Development

Division of the DTI. The Gender and Woman's Empowerment Unit of the Department of Trade and Industry committed to addressing the issues of gender equity and economic growth as part of its business mandate. Acknowledging that gender equity is an economic issue that is critical in fast-tracking South Africa's economic requested an indicative study, to determine the extent to which financial service providers in the country were adequately aware of the challenges that women entrepreneurs face in South Africa (Matiwane, 2006).

Owing to the reproductive role of women in the society, they venture into business merely to supplement family income. Kibera and Kibera (1999) argue that women view entrepreneurial activities as survival strategies. Other negative factors for women-owned business start-ups include discrimination. In a study of the exodus of women executives and professionals in large organisations, it has been observed that 'glass ceiling and discrimination' in the corporate world was responsible. This does not take cognisance of the fact that, women measured success in terms of self-fulfilment and goal achievement (Buttner and Moore, 1997). The main limitation of most studies is that, success is measured in economic terms and not by the motivation for business start-ups. Mitchell (2004) notes several authors who suggest that women entrepreneurs are less concerned with making money. They view entrepreneurship as a means of meeting their career needs and those of their family members. Brush (1992) observed that, most women view personal success as achieving a balance between family and work. Business growth is not the goal of most women entrepreneurs.

This in part, explains why women's businesses are small compared to their male counterparts. The earlier arguments indicate that women-owned businesses are affected by factors such as level of education, industry difference, age of industry and motivation for business start-up. A change in societal attitudes and transformation of traditional institutions and structures which hamstrung women entrepreneurs should be implemented. The problems facing female entrepreneurs in general are recognised by the South African government. The White Paper (1995) emphasises the following aspects relating to female entrepreneurs:

1. Problems female entrepreneurs experienced in the past are with regard to legal status and access to finance (White Paper, 1995).
2. Special needs of female entrepreneurs with regard to the provision of appropriate infrastructure (White Paper, 1995).
3. Special training needs of female entrepreneurs (White Paper, 1995).
4. The need for tax concessions to large enterprises that support female entrepreneurs (White Paper, 1995).
5. The need to improve the position of female entrepreneurs as an initial high-priority target area in the

Table 1. Number of self-employed adults (18+) by race and gender in 2005.

Gender	Race			
	Black	White	Coloured	Indian/Asian
Women	1,009,114	119,671	21,535	10,354
Men	833,704	281,712	45,093	69,918

Source: Labour Force Survey (2005).

small-business development effort (White Paper, 1995).

RESEARCH METHODOLOGY

Data collection

As suggested by Alam (2011), the data collection was obtained from both primary and secondary sources. Findings, however, are based as far as possible on primary information gathered from institutions in financial services, business development service and women entrepreneurs themselves. The DTI criteria was used which define a micro enterprise as one that employs four or less, a small enterprise as one that employs five to fifty and a medium sized business as one that employs fifty one to two hundred. Access to finance, for the purpose of this study, signifies the ability for women in business, to be able to access savings and insurance products, all sorts of debt products (loans, overdrafts, credit cards, leasing, factoring, trade finance, project finance, etc.) as well as equity financing, venture capital financing, etcetera, that can be used to grow their businesses.

Studies on small businesses have become a rarity in the country over the last five to six years. The publication of an annual State of Small Business Report has not occurred for the last three years. Data on the incidence of women (and others) in business is not consistently gathered, tracked or published. The section which analyses data from the FinScope and Labour Force Survey shows inconsistencies between certain available data. One of the few agencies which have produced some work in the area is the SME committee of the Financial Sector Charter Council. Given the high expectations from the small business sector in terms of employment creation and promoting national equity, production of accurate and regularly tracked data is essential. The effectiveness of the profuse investments of the state and donor agencies will not be known without precise data and tracking of progress.

RESULTS AND DISCUSSION

Data surveys (Table 1) show that, while race is still a primary driver of financial access in South Africa, a gender gap also exists which cuts across the races. The combination of race and gender disparities works largely to the detriment of black women, who register the lowest levels of income and of formal access to economic opportunity and financial services. Despite having a higher rate of participation in the labour force than white women: 73 against 59%, black women have the lowest level at 14% of formal employment rates. This is contrasted with 43% for white men, 34% for white women and 21% for black men. Black women also have the lowest level of earnings (Thabethe, 2006).

The direct connection between poverty, waged

employment and use of financial services implies that, without growth in economic opportunity, use of financial services will remain limited to a few, to the long-term detriment of the financial sector and the economy as a whole. Black women currently represent the smallest segment of “formally banked” in the population at only 38 compared to 44% for black males and 94 and 91% respectively for white males and females (Thabethe, 2006). Females also have the lowest usage of most financial products, from retail store accounts to life insurance, medical insurance, short-term insurance and loans. The only exception is savings clubs, where they register the highest usage even though the figure, at 9%, is still low in absolute terms. Physical access is a barrier to usage, even when patrons are banked, and is largely race-driven. The survey indicates that in 2005, 88% of banked white women were able to reach their bank within 10 min, while the corresponding percentage for banked black women is only 22%. Another telling figure reveals that, where 2% of black men and women had home loans in 2005, the figure is 26 and 32% for white women and men respectively. This has a direct impact on black entrepreneurs’ ability to raise collateralised credit for business use and requires creative solutions from financial institutions (Thabethe, 2006).

The Broad-Based BEE Act of 2003 specifies the importance of increasing the extent to which black women own and manage existing and new enterprises, and increasing their access to economic activities, infrastructure and skills training (Finmark Trust, 2005). The Act further notes that “in order to comply with the equality provision of the constitution, a code of good practice and targets therein specified may distinguish between black men and black women”. Despite these provisions in the Act, the Financial Sector Charter of 2003 only specifies gender targets (which are extremely low) in staffing. It is totally silent on gender equality in enterprise development or in procurement finance. The Codes of Good Practice for preferential procurement and enterprise development that came out in 2005 similarly do not distinguish between black men and black women at all, despite the Act’s provision that they may do so in order to comply with the equality provision of the constitution. Consequently, most financial institutions work on an assumption that, BEE strategy will automatically benefit women. In reality, this is not the case and could lead to a marginalisation of black women, if adequate measures are not taken soon.

Are financial institutions reaching black women?

In 2005, out of 170 women surveyed across four provinces, only 7 were familiar with the development finance institutions in their provinces. This reflects a paucity of marketing by these institutions to this target market, and of limited use of networks such as businesswomen's organisations, trade organisations, local structures and public media. Their strategies are still largely based on an assumption of gender neutrality, and it is certain that more opportunities could be exploited with a focused attempt to analyse the strengths of this particular market. The other evident weakness is that, there is no uniform standard amongst institutions for defining a women-owned enterprise; the definition can vary between 20 to 51% and women's shareholding.

1. 51% for IDC's franchising unit portfolio in 2005.
2. 49% of Khula's disbursements in 2004 to 2005.
3. 33% of NEF's 2005 disbursements.
4. 23% target exceeded in Business.

Of the big four commercial banks in South Africa, only two have started implementing clear strategies to target the women's market, and of these only one is seriously targeting the women's SME sector. Most banks' MIS systems do not yet seem to be adequately equipped for real market segmentation and gender disaggregated data on portfolios was not readily available. Availability of loan staff who can communicate in local languages is an urgent necessity, since lack of language skills are a serious impediment to confidence building for small entrepreneurs, particularly in rural areas. Having staff whom are aware of how to communicate with women customers without appearing discriminatory is also crucial; one of the big four banks is aware of this and has integrated gender-aware staff training into their strategy towards banking women. Micro finance for its part is often seen as a resource for women's economic empowerment.

However, despite the large and growing number of self-employed women in South Africa, only two sustainable micro enterprise lenders exist: Marang Financial Services and Small Enterprise Foundation, which together serve some 56,000 clients (Cutura, 2005). Rural areas are still very under-serviced; therefore further disadvantaging those already neglected by the first-tier banks. Urgent investment and expansion in this sector and financing needs to be accompanied by real gender impact analysis is recommended. Such analysis needs to focus particularly on the type of skills development that could encourage sustainable growth of business beyond micro enterprise level. Although a multitude of local networks and national structures are springing up on an ever increasing and powerful scale, it is still not enough to get women on the same credibility scale as men. On a wide range of issues pertinent to women's success in business, as well as their personal well-being and growth,

a selection of these networks and structures includes:

1. Woman Development Bank (WDB)
2. Business Women's Association (BWA)
3. The South African Professional and Businesswomen's Network
4. SA Council for Business Women
5. SA Women's Entrepreneurs Network
6. Technology for women in Business
7. Women at Work

These groups and structures not only provide an opportunity for women entrepreneurs and women business people to meet together, network and support each other, but also provide powerful platforms from which to advance and represent their interests as business people and entrepreneurs (Beeton, 2008).

Women are better payers than men, yet get less credit

Credit bureaus are criticised in South Africa and are seen to have further disempowered black South Africans who have been listed for minor failures owing to economic precariousness, which was a characteristic of the apartheid economy. Despite the fact that fewer women appear to get black listed than men, the trends do not work in favour of women's greater access to credit from institutions. It was not possible to obtain causes of listings from the credit bureaus, which would help to distinguish business from personal reasons, or marriage from own causations. This would better serve the needs of the customers and credit providers. Community of property marriages sometimes have a considerably negative impact on women's ability to access credit and build sound credit histories in their own names. Further research and public awareness is required on this subject, so that women and men are better educated on their responsibilities in this regard.

In the micro enterprise sector, women are well-known for being better payers than men, yet the credit histories from this sector are not always available to the wider banking sector. This emphasises the need for co-ordinated credit selection mechanisms that can pool histories from all tiers of institutions and for wide use of the National Loan Register by all qualifying institutions, including micro finance institutions. It can be argued that, the issue of gender has a bearing on low investment in women-owned businesses. In society, most women lack sufficient capital to invest in large and technology-intensive businesses. Owing to the gender division of labour, some of the money which could be invested in business is utilised to support families. There are just over 15 million women aged 18+ in South Africa, compared to around 14 million men of the same age.

1. 77% or 11.5 million of all women are black, 11% white, 9% coloured and 3% Indian or Asian.
2. More than half of South African black women (56%) live in 3 provinces: Gauteng (22%), KwaZulu-Natal (20%) and the Eastern Cape (14%).
3. 40% of women (18+) live in villages, 28% live in cities and (32%) in towns. While the distribution for men is broadly the same, a racial breakdown reveals that only 2% of white women live in villages, compared to 50% of black women.
4. According to the 2004 General Household Survey (GHS), 64% of male-headed households live in urban areas compared to 51% of female-headed households (Finmark Trust, 2005).
5. 57% of all black women are aged between 18 and 35, while less than a quarter of white women are aged between 18 and 35.
6. Hunger among black adults is most pronounced in rural areas, indicating that subsistence farming opportunities are limited or inadequate and that other sources of income are required to sustain households who live in these areas.
7. 51% of black women, on average, have gone without cash income. The heaviest burden is borne by black women in villages where 63% have gone without cash income. The income generating potential of such women is thus highly constrained.
8. As with location, there are noticeable differences in living standards between female-headed households and male-headed households. According to the General Household Survey, households in rural areas headed by black females are noticeably more likely to experience hunger than other households (Finmark Trust, 2005)

Risk aversion by female entrepreneurs can be explained by the type of SMEs which women engage in and the business strategies they pursue, hence the low profit returns by female-owned businesses. This is consistent with the 'Finance theory' which suggests that the higher the risk, the higher the expected rate of return on an investment and conversely the lower the risk, the lower the expected rate of return (Watson and Robinson, 2003). There are attitudes and perceptions that businesswomen have to deal with, according to Nkata (2006). There are challenges faced in just being a woman. People do not take you seriously, and women have to work much harder than their male counterparts. That makes things difficult in the business world. If male businessmen struggle to get finance from financial institution, how much more difficult is it for women?

Access barriers

The data reveals that while there are some clear differences across gender, race is still a more powerful discriminator of patterns of usage of financial services.

This is not surprising in the South African context. However, it raises a critical question for policymakers: will the gender gap in usage of and access to financial services become more noticeable as racial imbalances are rectified? To answer this question, survey data can be used to identify some potential access barriers that might impact on women specifically. As a first step, it is important to distinguish between access and usage. Some people may have access to a product and may choose not to use it. It is therefore critical to assess whether those who do not have or use a product or service do so out of choice, or because various factors constrain their ability to do so.

Such factors may arise because of rigorous client qualifying criteria or minimum payment or premium amounts, or the way the product is distributed or serviced (for example, reliance on employer-related distribution mechanisms limits access to those who have a formal job). Access barriers may also arise because of various demand-side factors such as low levels of awareness of the product and/or its potential benefits, limited ability to physically access the product or a distrust of providers or various sales or service channels. Awareness of financial terminology is also a significant potential access barrier. In this regard, gender/race differences are noteworthy, particularly with respect to terminology relating to credit products (for example, bad debt, interest rate payable and term of loan). Across all race and gender segments, there is a relatively high understanding of basic financial terminology such as savings, ATMs, stokvels and burial societies, although, awareness of product-specific terms such as interest, transaction banking, technology or insurance, is low.

Familiarity with the term 'Ombudsman' scored very low, particularly for black men (5%) and women (3%) are a concern. This implies that potential financial services customers may not know that they have recourse should providers fail to deliver. Given that usage of a bank account is often a prerequisite for access to other services, this area will need further investigation. Other access barriers include:

1. Employment status
2. Income levels
3. Awareness of financial issues
4. Proximity to financial providers
5. Attitudes to technology
6. Lack of appropriate and affordable products and services

Lack of financial confidence

Other data from FinScope provides an indication of the levels of financial confidence that women have. Overall, women appear to have lower levels of financial confidence than men. They are least likely to agree with

the statement “you know quite a bit about money and finances” and more inclined to ask family or friends for advice than men. Generally, women are less likely to play the role of advisor than their male counterparts (“People often ask your advice on financial matters”). While 70% of black women trust their own experience rather than the advice of others, only 40% say they know quite a bit about money. This indicates that there is limited trust of, or access to those who may give financial advice.

Technology

Attitudes to technology are also commonly thought to limit access to products and services that are technology-intensive. Almost one quarter of black women indicate that, they find it difficult to use the technology associated with banks’ products and services, compared to 19% of black men, 9% of white women, and 10% of white men. 58% of black women indicate that, they are prepared to use technology compare to 75% of white women and 80% of white men.

However, other statements might indicate that black women would be as happy to use technology as face-to-face channels. In fact, other evidence on usage of technology-intensive solutions, such as SMS based services, indicates that where the service is clearly of benefit and where there is access to the channel, customers are able to master the skills required. Age is another primary driver of attitudes to technology. Around 70% of women younger than 40 would be prepared to use technology, compared to 52% for women aged 40 to 64 and 34% for those aged 65 or older.

Gender imbalances

Professor Ashley Smyth is of the opinion that, decision-making is often affected by traditional gender views that pertain to social and corporate spheres. Those views are based on an expectation of certain roles and functions that men and women must fulfil in society (Figure 1). Gender is a social construct according to which the expectations and responsibilities of men and women are not always biologically determined (Snyder and Tadesse, 1995). Gender determines what men and women should and should not do. Gender roles determine who does what work, both in the private and the public sphere. The reproductive role comprises the childbearing/rearing responsibilities and domestic tasks undertaken by women, required to guarantee the maintenance and reproduction of the labour force (Moser, 1993). In addition to biological reproduction, the reproductive role of black women in African countries like South Africa includes fetching water and firewood, and providing for the material and emotional needs of extended family members.

Practical gender needs are the needs women identify in

their socially accepted roles in society. Practical gender needs do not challenge the gender division of labour or women’s subordinate position in society, although arising out of them (Moser, 1993). In the case of female entrepreneurs, practical gender needs will include child care services located in women’s places of employment. The predominance of women in enterprise which are in line with their traditional reproductive roles, for example dressmaking and other service industries, are the result of government’s attempt to address practical gender needs. Strategic gender needs are the needs women identify because of their subordinate position to men in society. Strategic gender needs vary according to particular contexts. They relate to the gender division of labour, power and control and may include issues such as legal rights, domestic violence, and equal wages (Moser, 1993). Strategic gender needs are not easily identified. In the context of this research, strategic gender needs include the following:

1. Entrepreneurial policy which takes into account the needs of women.
2. The removal of laws which make it difficult for women to unlock financial institutions like banks to access loans.
3. The abolition of gender division of labour which constrains women’s entrepreneurial activities, for example one of the factors which hamstrung women entrepreneurs is their reproductive roles.

Nevertheless, women as human resource are underutilised. Owing to their reproductive roles in society women are the main providers of food and other material needs for their families.

In most African countries, including South Africa, the recent past has witnessed the growth of female-headed households, namely the *de jure* female-headed households, in which the male partner is permanently absent due to death or separation and the woman is legally single, divorced or widowed. Another type of female-headed household is the *de facto* female household, where the man is temporarily absent from the home and has migrated to work in other countries. The husband normally sends remittances to support his family (Moser, 1993).

The development of female entrepreneurship for socio-economic development in a developing country like South Africa cannot be over-emphasized. Liberal feminists suggest that women are disadvantaged relative to men due to overt discrimination by, for example, money lenders and/or systematic factors that deprive them of vital resources like business education and experience (Erwee, 1987; Fischer et al., 1993).

As noted by Moser (1993) strategic gender needs, unlike practical gender needs, are not easily identified by women. They require a higher level of education and perception.

The low level of education of women entrepreneurs in

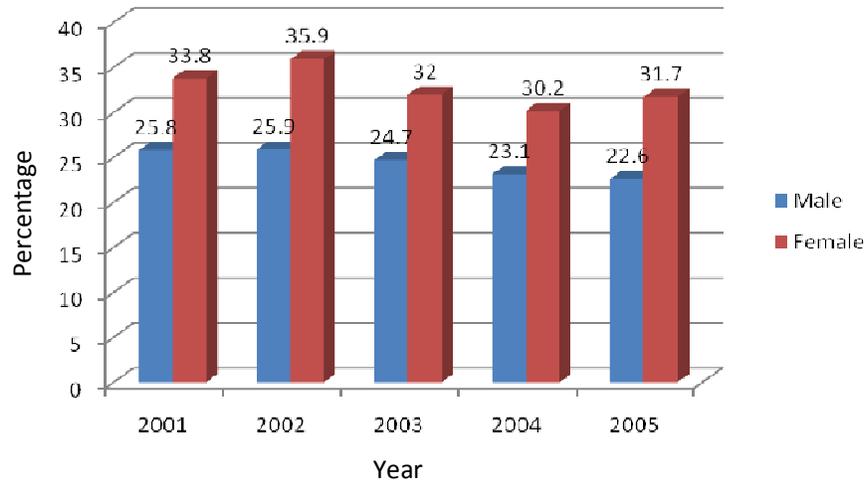


Figure 1. Unemployment by gender: Adults aged 16-64.
Source: Labour Force Survey (2005).

the focus groups and their lack of awareness on human rights issues, especially women's rights, make it difficult for them to identify strategic gender needs (Hisrich and Brush, 1985), such as the laws which constrain women entrepreneurs.

In the study, strategic gender needs were identified by expert interviewees, including women entrepreneur awardees. Women entrepreneur awardees mentioned that the gender division of labour, especially in the private sphere, negatively impact on their enterprises, but could not suggest appropriate strategies which should be in place or followed to combat the problem. Expert interviewees, especially women entrepreneurs, were disgruntled about the control of the means of production, such as land and cattle by men.

In Western societies, of late, more women have ventured in traditionally male-dominated areas or fields, like information and communication technology and construction industries by taking into consideration the fact that, women are not a homogenous group. However, policies and programmes should consider that women differ according to a number of variables, such as geographical location, sexual orientation, socioeconomic status, ethnicity in countries with various ethnic groups, to name but a few to identify the types of business in which female entrepreneurs are engaged:

1. To determine the motivation for business start-up.
2. To ascertain the extent to which gender issues impact on female entrepreneurship in South Africa.
3. To identify constraints affecting female entrepreneurs in entrepreneurial activities.
4. To suggest strategies to encourage the development of female entrepreneurs in South Africa.

In South Africa, in an effort to overcome obstacles and discrimination faced by women entrepreneurs, the women's network called the South African Women Entrepreneur's Network (SAWEN) was established. SAWEN addresses problems specific to women, for instance gender discrimination and all the negative perceptions about women entrepreneurs. In one case, a woman indicated that she had R 500, 000.00 in cash as well as personal assets for collateral to start a new business. She had completed an MBA, had been highly successful in the corporate sphere, and enjoyed the status of being a platinum client of her bank. Her application for a R 100, 000 loans to help manage the cash flow in her new business was turned down after a month's wait. The woman also had to endure the humiliation of being asked by a banker about whether she does not have a husband, father or brother who could sign surety! Ultimately, she used her relatively high levels of personal credit to manage her cash flow requirements, something which is common amongst new and even established business owners, owing to the difficulties in raising business finance.

SAWEN is managed by the Gender and Women Empowerment Unit of South Africa (Programmes and Economic Opportunities: setting up your small businesses, 2005). Liberal feminists argue that because of certain variables, such as industry differences, age of industry, differences in hours worked and systematic difference in the type and level of education and differences in motivation, women's businesses will perform less compared with their male counterparts (Watson, 2001). The assumption is that, if discrimination and systematic barriers are removed, there will be no difference in terms of performance between male and female entrepreneurs.

Women and men are presumed to be 'essentially rational'. "Rationality is assumed to be a purely mental capacity, and is regarded as what is especially valuable about human beings (Fischer et al., 1993). The systematic factors highlighted by liberal feminists are influenced by the gender division of labour in both the public and private spheres. The gender division of labour refers to different roles, responsibilities and activities which are allocated to men and women in society (Canadian Council for International Cooperation, 1991).

They further contended that women entrepreneurs are affected by such variables as the type of industry in which they engage in, number of hours devoted to entrepreneurial activities, the level and type of education, the age of the industry and the motivation for business start-up and expansion. Owing to gender division of labour and the reproductive role which is a woman's prerogative serve in traditional societies, women entrepreneurs devote less time in their businesses. The types of businesses which women venture into are in line with their reproductive roles, for example, sewing where the revenue is small and the business does not increase rapidly. The high incidence of HIV/AIDS has also increased the work load for women. With regard to community service, some women have been tasked with the responsibility of providing home-based care services to families affected by the HIV/AIDS pandemic. Female entrepreneurs therefore have less time to devote to entrepreneurial activities.

Contrary to the Liberal feminist theory, Social feminist theory suggests that "due to differences in early and ongoing socialisation, women and men differ inherently. However, the differences do not imply that women are inferior to men as women may develop different but equally effective traits. Studies consistent with social feminist perspective have documented few consistent gender differences and have suggested that those differences that exist may have little impact on business performance (Fischer et al., 1993). The department of Trade and Industry, Gender and Women unit believes that, gender equity is an economic issue that is critical in fast-tracking South Africa's economic growth. Recognising that gender inequality inhibits businesswomen from fully participating in private sector development, IFC launched the Gender Entrepreneurship Markets (GEM) programme in December 2004. The programme aims to mainstream gender into the IFC's work in key areas, while helping to better leverage the untapped potential of women as well as men in emerging markets.

Motivation for business start-up and expansion

The gender division of labour in family households influenced women to engage in entrepreneurial activities. Women, as principal providers of food and other basic necessities; such as education and health care services,

venture into business to provide for the material needs of their immediate and extended family members. Rutashobya and Nchimbi (1999) supported this assertion when they contended that, in Africa, women venture into business because of their reproductive roles. Owing to societal expectations, women's reproductive roles compel them to venture into business in order to be able to combine business activities with household chores, hence the predominance of home-based enterprises by women entrepreneurs in the study.

Several authors contend that women venture into business to enable them to interface work with family responsibilities (Aidis, 2002; Berg, 1997; Brush, 1992; Buttner and Moore, 1997; Chell and Baines, 1998; Hisrich and Brush, 1984; Marlow and Strange, 1994). Brush (1992) for example, argues that the motivation for business start-up by female entrepreneurs indicates that for a woman a business is not a separate economic activity as the case with men, but women perceives their businesses as "cooperative networks" of relationships. The author maintains that 'women's reality is 'web-like' connecting family, work and community relationships'.

Another motivational factor noted in the study for business start-up is the failure of the formal labour force to absorb a large number of black women in South Africa.

There are a number of factors for this state of affairs, for instance the lack of required skills in respective industries due to limited education among black women in South Africa and to a lesser extent, gender discrimination in the formal labour force (Butter and Moore, 1997). The under-representation of women relative to men in formal employment has been cited in a study in the Northern Province in South Africa as motivation for business start-up. The study revealed that 87.5% of the male entrepreneurs were previously employed as opposed to 44.71% of women entrepreneurs (Mitchell, 2004). The findings indicated that women entrepreneurs, in both the younger and older groups, started their business ventures as a result of negative/push factors as evident from comments such as the following:

"My parents died when I was very young, so I had to venture into business to pay school fees for my sisters and brothers and now I am able to support my own children."

Although the issue of unemployment affects both women and men in South Africa, it seems that women experience problems of discrimination in the formal sector, compelling them to venture into business as stated by a commentator:

"I failed to secure a job in the formal sector and had to find alternative means of earning a living for myself and dependant family members."

Focus group discussants did not indicate any pull/positive

factors for business start-up. It was, however, encouraging to note that women wanted to run their own businesses to be independent as evident from responses such as the following:

"I do not want to depend on my husband for basic necessities, which is my reason for venturing into a business."

Similar responses were expressed by women entrepreneur awardees as evident from the comment by one of the interview experts:

"I ventured into business because I wanted to be independent and be my own boss."

Focus group discussants in both the older and younger groups identified practical gender needs, such as the provision of water, electricity and day-care centres to alleviate the burden of performing domestic chores. These needs reinforce the gender division of labour in the private sphere. Some of the needs identified include training, especially on business-related issues and credit to finance their businesses. The main interest for the women entrepreneurs was to have enough money to support their families.

Reflection

The history of the exploitation of women in South Africa is one of tragedy. For this reason, the democratic government has, during the past 15 years committed itself to diligently and systematically reversing this trend of exploitation. A number of very important progress have been made, but the nation still have a long way to go and observers will continue to be deeply concerned that the South African economy continues to reflect deeply twisted gender imbalances. For instance, half of all black women are unemployed. Black women dominate the social services sector, with 30% employed as domestic workers. In general, black women are mainly employed as teachers and nurses; positions in which they have excelled, but occupy only 1.2% of all top management positions. Women only occupy 1.5% of all directorships in major South African companies, and black women occupy only 0.5% of directorships.

Furthermore, it was found that, in all sectors of the economy, there remains a significant disparity in earnings between women and men. For example, women earn 66% what men earn in the finance sector, 65% in manufacturing, 75% in trade, and 86% in services. It is for this reason, that in South Africa, women will remain a crucial target group receiving close attention in efforts to broaden participation in the economy. To emphasize the importance of gender equity in the Business society in South Africa, several support services for women were

established. These integrated services have been delivered through the Technology for Women in Business (TWIB), the South African Women Entrepreneurs Network (SAWEN) and now the Women's Fund. All of these provide unique services that are designed to address the specific needs of women's businesses; the largest segment of our population is black women. Growing women entrepreneurship is therefore, quite logically, an important imperative to broaden participation and to ensure that our growing economy becomes more inclusive. Quite logically, therefore, is that the greater the participation of women in our economy, the more realistic our target of dramatically reducing poverty and halving unemployment within the next decade. Indeed, women are the driving force of the South African Economy.

Yet, as true as this may be, there are concerns that despite the fact that women-owned enterprises are contributing an increasing share to national income, women remain underrepresented in formal-sector enterprises and over-represented in micro enterprises and the informal sector. Approximately 70% of informal businesses in South Africa are owned by women. Currently, the typical South African women entrepreneur is black, with no tertiary education, and earns an income from crafts, hawking, personal services or retail.

However, there are also, increasingly, encouraging stories of women who are moving away from traditional hawking into more value-adding business opportunities, such as franchising, furniture manufacturing, printing, travel agencies and property development to name but a few. Despite this, a 2005 FinScope survey found that only 38% of black women are formally banked, 20% of women use informal products such as stokvels etc, and 42% of black women are entirely excluded with no financial products of any sort. What is more disturbing (but indeed consistent with the many barriers that women continue to face), is that women have better credit repayment records than men, yet find it harder to raise finance than men. The 'power' relationships between women entrepreneurs and their male spouses or companions contributed to them having almost no control over the income that was generated from the business enterprise. This contributed largely to the lack of re-investment and this often resulted in the failure of the enterprise. Successful women entrepreneurs inadvertently threatened the traditional role of men in the household, as breadwinners of the family; this often contributed to domestic violence.

The inequity of this problem is further exposed if you consider the following facts: The Global Entrepreneurship Monitor (GEM) is a global research project that measures and compares entrepreneurship activities in over 42 countries worldwide. The 2007 rankings reveal that, although South Africa's female entrepreneurs are performing below average when compared to women in other emerging economies (Melzer, 2004), the position of 23rd, they outperformed South Africa's overall performance and, their male counterparts. What these statistics

show is that, indeed on the ground, it is women who are taking the lead as entrepreneurs; but it is also known from the analysis of the interventions that were taken to support the small business sector, that access to finance for large numbers of black women remain a serious, if not the most serious, obstacle. It is also of concern that early indications received suggest that women have to a certain extent been marginalised from current Broad Based Black Economic Empowerment (BBBEE) initiatives, especially since the process has not filtered down sufficiently to those women owning small and medium sized enterprises. Clearly, affordable finance can and will make an impact in forcing down the closed doors, Olive Schreiner (2006) wrote about in 1911.

In this regard, the fund being launched today represents a further approach in dealing with this challenge (Mpahlwa, 2008). It is a most positive development that the private sector is beginning to address this challenge.

The capitalisation of R100 million, provided by The DTI and Old Mutual Masisizane Fund, is meant to show the market an innovative way of addressing the challenge of supporting women entrepreneurs by providing affordable, usable and responsive finance. By responding directly to the needs of women, it is believed that the initiative will improve and expand the state women entrepreneurship, thereby expanding the quantity and quality of women entrepreneurs.

Finally, as the beginning of this additional approach in the arsenal of making our economy more inclusive to women, the first phase of the Isivande Women's Fund will be launched by Old Mutual. It is a phase that will be primarily biased towards small to medium sized enterprises, providing loans from R 30, 000 to 2 million. Priority will be given to rural and peripheral-urban enterprises. More than that, additional financial institutions should come on board to educate, and support female entrepreneurs.

Conclusion

The importance of historical racial policies on poverty, employment and income levels of South Africans were analysed in this study. These policies have resulted in self-employment becoming an important means to generate an income, particularly for black women. While BEE policies aim to increase formal sector employment opportunities for women, self-employment will continue to play a critical role in enabling women to participate in economic activity particularly for women in rural areas, who have less access to formal education. However, the data also shows that most self-employed women generate very limited earnings from their activities. Low earnings levels are a significant barrier to access to financial services as available products are often unaffordable.

Given that women tend to earn less than men, affordability constraints are likely to have a more significant impact on women than on men. In addition, the focus on

employer-based distribution channels makes many contractual savings products inaccessible for those men and women who are self-employed. Given that self-employment is more significant for women, these biases have a more noticeable impact on women. The data also shows that women need access to a range of financial products and that, while the emphasis on credit is understandable, access to other basic products, particularly savings products, should be given due attention. Women are also disadvantaged by their lower levels of financial literacy and awareness. Given limited exposure to financial material via mass media channels, product providers who seek to educate potential customers will need to find other, more direct methods of reaching women.

Physical access is a further barrier that impacts both black men and women especially in the rural areas. While access barriers are significant, the opportunity for financial services companies who can provide affordable, appropriate and accessible products to meet the needs of self-employed women is significant. The Mzansi accounts are still new, but would warrant a thorough assessment after several years to be able to verify whether they have made inroads in servicing and benefiting this segment of the population. The sheer size of this market, and its potential to alter the status of household income and security, warrants the attention of policy makers and product providers.

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Full Length Research Paper

A strategic reposition of the maritime industry for economic recovery and sustainability: “The Cabotage Act”

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The Cabotage Law came into force in April, 2004 (Cabotage Act, 2003) aimed at reserving the costal shipping for Nigeria nationals. In essence, the system of maintaining domestic shipping industry is being regulated by the Cabotage Law. This involves the merchant fleet, and the protection of the environment and bio-diversity. The study is of the view that if the Cabotage Law is properly implemented; Nigeria will be able to maintain jobs and skills in an industry that is vital to its future. Lack of knowledge about the maritime sector could be the basis for the very poor response that it has generated from investing public. The oceans are as old as the maritime trade and dates back to the beginning of recorded time. Nigeria can only negate the development of its maritime potentials at its own peril especially taken into consideration here expensive maritime resource.

Key words: Cabotage, economy, maritime, transportation and shipping.

INTRODUCTION

The term “cabotage” is a Spanish word which refers to the maritime trade along country coastlines. In the context of its usage in the study, the term Cabotage refers to the coastal shipping opportunities which exist in respect of Nigeria’s coastal maritime trade.

The captivation of this lucrative shipping market opportunity is expected to occur as a result of the compulsion of the restrictiveness provisions of Cabotage Law. The market reservation provisions of the law is intended to achieve the reservation of a significance part of the Nigerian coastal shipping business opportunity, particularly those existing in respect of the local carriage of goods, the coastal transport of men and materials, the supply of offshore vessels of differing operational and market role description, the supply of all manner of shipping services between all Nigerian coastwise and offshore locations for Nigerian operators only (Walter, 2010). The commencement of the cabotage regime is

supposed to effectively signal the rebirth of Nigeria as a budding regional player (Abubakar, 2002).

The Cabotage Law came into force in April, 2004 (Cabotage Act, 2003) aimed at reserving the costal shipping for Nigeria national. In essence, the system of maintaining the domestic shipping industry is being regulated by the Cabotage Law. This involves the merchant fleet, and the protection of the environment and bio-diversity (Ballack, 2005). The study is of the view that if the Cabotage Law is properly implemented, Nigeria will be able to maintain jobs and skills in an industry that is vital to its future. Lack of knowledge about the maritime sector could be blamed for the very poor response it has generated from investing public (Agidee, 2001). The oceans are as old as the maritime trade and dates back to the beginning of recorded time. Nigeria can only negate the development of its maritime potentials at its own peril especially taken into consideration her expensive maritime resource. (Ozuruya, 2007)

The nation has been losing as much as \$4 billion U.S dollar to foreign ship owners yearly owing to lack of indigenous capacity in the local maritime transportation.

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This lack of participatory capacity was attributed to the inability of indigenes to invest in the maritime transportation sector. The situation is quite critical to the extent that transport services for the personnel and equipment for oil exploration in the deep sea were being rendered by foreigners, which has caused the country dearly.

It is the opinion of the ship operators and maritime stakeholders that with the advent of the Cabotage Law and the local content policy of the government, which should be supported by proper implementation, it is hoped that better days lie ahead for Nigerian businessmen who could key into the merit of the Act. The local operators should be prepared to tap into the multiplier effect of the Cabotage Law (Ozioruva, 2004). The law gives room for ship building, shore to rig services, green field development and manning. In turn, Nigeria would as well make its system attractive to foreign investors. Given legislative backing by moving local content from 40-70% in the near future. It is conceived that there would be more shipping services such as ship chandelling, agencies and haulage for Nigerians (Agbakoba & Associates, 2002). However, Cabotage guidelines specified the procedure of implementing the Act. However, currently it has been receiving a lot of criticism from the public and stakeholders. In sum, according to the Cabotage Law, cargo means goods carried on a vessel whether or not for commercial value and include livestock, whereas coastal trade or Cabotage means, the carriage of goods by vessels or any other mode of transport (Ballack, 2006), from one place in Nigeria or above Nigerian waters. Either directly or via a place outside Nigeria and includes the carriage of goods in relation to the exploration or transportation of the minerals or the minerals or non-living natural resource of Nigeria.

However, the impact of the Cabotage Law cannot be overemphasized in that the agency is to see that ships within the zone comply with the international conventions and National Safety Regulations. In addition, NIMASA is responsible for promoting indigenous maritime capacity, particularly in the ship, ownership, greater tonnage and an enlarged professional work force. According to Decree No.10, 1987 and other related functions by Section 2 of the Cabotage Act, it covers the carriage of goods by sea and passengers originating from one coastal or inland point, which could be port, terminals, jetties, piers etc., to another point located within Nigeria. It as well revolves around the following:

1. Carriage of goods and passengers by sea in relation to the exploration, exploitation or transportation of mineral and non-natural resources whether offshore or within the inland and coastal waters.
2. Carriage of goods and passengers on water or underwater (sub-sea). Installations.
3. Carriage of goods and passengers originally from a point in Nigeria destined for Nigerian market but transiting through another country then back to the Nigerian market for discharge.

4. Operation by vessel in Nigeria waters including tonnage, pilotage, dredging, sawage, bunkering etc.

The Coastal and Inland Shipping (Cabotage) Act 2003 was quite recent; the Act is part of the policy of government to create opportunities for Nigerian to participation in all sectors of the economy. The enactment of the Act was also in response of the yearning of Nigerian stakeholders within the maritime industry both in the public and private sector for legislative intervention to stimulate the participation of Nigerians in its domestic coastal trade.

In recognition of the technical capacity of the shipping industry, Section 51 of the Act provides for a transition period of one year within which the necessary modalities and guidelines for the smooth running of the Cabotage regime would be developed. To facilitate the enforcement of the Cabotage Act, the Honorable Minister of Transport constituted a committee on the modalities for the implementation of the Cabotage on the 12th of February, 2004. The act was divided into four; enlightenment/ sensitization, operations and enforcement, Cabotage Vessel Financing Fund, and Legal/Regulatory Framework.

The study therefore seeks for more indigenous participation in the maritime industry with the aim of repositioning the Maritime industry for economic recovery and sustainability (Cabotage Act, 2003).

Problem statement

The essence of the cabotage Act is to allow more indigenous ship operators to participate in the Nigerian Maritime industry for economic recovery and sustainability. However, the current outlook seems discouraging as more foreign operators are rather patronized within the Nigerian Maritime industry.

Research question

The above statement led to the following research questions:

1. What are the significant effects of foreign vessel operators' dominance on the maritime industry in Nigeria?
2. How does the current state of affairs affect the Nigerian economy at large?

Research objective

The objectives of this research are:

1. To examine the effects of foreign vessels operators' dominance on the maritime industry in Nigeria,
2. To establish the impact of this foreign vessels operators' dominance on the Nigerian economy at large.
3. To explore other pertinent issues affecting domestic

Table 1. Throughput of indigenous tanker vessels hired by PPMC (2004 - 2007).

Year	Number of vessels hired by PPMC	Product moved by PPMC chartered vessels/MT	Charter fee (\$)
2004	10	1,848,673.115	39,413,056.80
2005	10	1,780,253.965	41,036,256.68
2006	10	2,739,162.113	41,144,436.09
2007	11	2,739,162.113	38,094,082.96
Total		9,107,251.306	159,687,832.53

Source: PPMC. Total product= 16,297,759.

maritime industry and to proffer suggestions toward the development of the sector.

METHODOLOGY

As aforementioned, this study is focused on the Cabotage Act in the Maritime Industry in Nigeria. Careful attention was made in selecting the data for this research. A combination of secondary and primary data was utilized in the study. Secondary data were sourced from NIMASA, NPA and other maritime industries news, periodicals, magazine, journal articles and internet website on related issues. Also, an extensive review of the Cabotage Act 2003 was undertaken. The primary data was obtained through a face to face oral interview of 15 selected operators, 20 investors and prospective investors, 10 government officials and 5 experts within the maritime industry. The study relied much on qualitative method. The rationale for this method of data collection is based on the fact that such data have the merit of being authentic, practical and to a great extent reliable. The benefits of this approach has been reinforced by Creswell (2003:181), who buttressed the originality and dynamic attributes of research methods, and stated that qualitative research is emergent rather than tightly prefigured. Several aspects emerge during a qualitative study. The research questions may change and be refined as the inquirer learns what to ask and to whom it should be asked. Alluding to the above, Dawson (2006) described qualitative research method as the exploration of attitudes, behaviours and experiences through such methods as interviews. Furthermore, the author added that such method attempts to get an in-depth opinion from participants.

Cabotage law and the maritime industry

Within the Cabotage regime, there is no doubt that the business and economy opportunity, has been enhanced. These economic potentials are fully actualized due to the determination of the Regulatory Agency, (NIMASA) to effectively implement the compliance to the later (Dauda, 2011). Having thus recognized and acknowledged the positive potentials of the cabotage regime, it is time to examine the true extent to which the stakeholders have been mobilized to exploit the considerable strategic opportunity which is represented by the law in force. However, there are clearly a number of factors, which the Act has provided for to boast the coastal trade such as;

Tonnage availability; The Act specified that for a successful Cabotage regime in Nigeria would essentially be required to consider the availability of Nigerian owned registered and crewed vessels of the appropriate market size and description.

Table 1 shows that indigenous operators were not allowed to fully participate in the maritime activities. Instead of allowing the indigenous ship to participate, PPMC chartered the ships and moved the products themselves. A total of 9,107,251.306 were moved by PPMC out of the total 16,297,759 total products

Tables 2 and 3 indicates that Nigerian ports including crude oil terminals for ten years (1997-2006) recorded cargo throughput of 1,324,700.166 by local and foreign fleet ship that patronize the ports and the crude oil terminals. The fact remains that in Nigeria today the carriage of crude oil is still credited to foreign flag ship by NAPIMS at the expense of Nigerian Economy.

Table 4 shows that out of the 42,276 total no of ships that entered the Nigerian port only 3,549 were Nigerian ships while 38,727 were foreign ships. Also out of the total 1,236,986,185 GRT, only 16,297,759 were shipped by Nigerian own ships while 1,220,690,426 were shipped by foreign ships.

This is not encouraging and does not support the Cabotage Policy. Hence, there is a need to motivate the participation of indigenous vessels within the National maritime industry.

Although this Act has been promulgated to support indigenous participation in the maritime industry, many people may be ignorant of it, which may hinder full participation. This is also in concordance with the finding of Alam et al (2010a) in the education sector in Bangladesh. According to them,

"The common culture of different parts of the world testifies that the mass population of a country is ignorant about the law... Even though the citizens of a country are the main user of law, they do not have any deeper understanding about it, making law an elite knowledge..."

From the same perspective, Zumeta (1992) cited in Alam

Table 2. Summary of the status of waivers granted under the cabotage regime, during the tenure of Dr. Sekibo as the HFOT.

Type of registration	Total waiver approved by the HMOT
Nigerian owned	228
Foreign	58
Bare boat	8
Joint venture	93
Temporary	21
Grand Total	408

Source: NIMASA.

Table 3. Cargo throughput at Nigerian ports (including crude oil terminals) 1997–2006.

Year	Ports inward	Outward	Total(A)	Crude oil shipped(B)	(A+B)
1997	11,213,624	5,369,181	16,582,805	99,667,533	116,250,338
1998	14,286,864	5,038,854	19,325,718	97,953,211	117,278,929
1999	15,751,331	6,482,605	22,232,936	92,462,264	114,696,200
2000	19,230,496	9,702,384	28,932,880	102,930,079	131,862,959
2001	24,668,791	11,271,901	35,940,692	100,732,875	136,673,567
2002	25,206,380	11,780,861	36,987,241	86,284,036	123,271,277
2003	27,839,293	11,926,652	39,765,945	85,797,681	125,563,262
2004	26,907,075	13,909,872	40,816,947	117,055,427	157,872,374
2005	29,254,766	15,697,312	44,952,078	112,872,821	157,824,399
2006	31,937,804	17,235,520	49,173,324	94,232,673	143,405,997
TOTAL	226,296,424	108,414,142	334,710,566	989,989,600	1,324,700,166

Source: NPA Statistics Department.

et al. (2010a) posited that countries always design both micro and macro level policies in order to achieve the desire level of national development. Dill (1997 cited in Alam et al. 2010a) is however of the view that policy is a wider guideline which does not necessarily control the daily life of a sector. Alam et al. (2010a) seem to concur with Dill, and stated that many indiscretions may be practiced, which bypass the policy guidelines. Hence, in respect of the new Cabotage Act, there may also be tendencies for people to try to maneuver rules and regulations.

Nevertheless, the Cabotage Act is a sign that the government is now willing to execute its function on behalf of the citizens. In similar vein, Alam et al. (2010b) have stated that,

“Business of state is to provide a decent life to its citizens giving a wider and increased access to their needs. A testimonial of significant success of business of state is gained when a state can maintain an increasing curve in both national and international competition. In the eye of public policy, it is no matter, whether the state itself engages in business operation directly or not. A business can be owned and operated by private organization or individuals. But through public policy, state has to ensure

an increased decent life for its citizen which is considered success.”

However, Alam et al. (2010b) have lamented that either for a faulty policy or international policy influence or weak implementation of a policy; many policies have become dysfunctional or reverse-functional.

In addition, within the education sector, in Bangladesh, Alam (2008: 259) observed that international influence and budgetary constraints are key enemies to make public policy functional. According to him,

“Policy is an insecticide used to kill all insects of education, preventing development. However, if the policy is virus affected or any insect kills the policy, there is little hope for an effective education sector. While legislators want to take the advantage of the policy, rules and regulations, the design and implementation of good policy is a nightmare” (Alam et al., 2010b).

This is the reason why the huge responsibility of public policy is not acceptable for many reasons nowadays (Alam, 2009). These observations by Alam in the education sector might as well be valid in terms of the slackness in the implementation of the Cabotage Act

Table 4. Nationality of ships that entered Nigerian ports (including crude oil terminals): 1997-2006.

Year	Nigerian		Non-Nigerian		Total	
	Number	*GRT	Number	GRT	Number	GRT
1997	353	1,650,604	3,232	91,192,737	3,585	92,843,341
1998	680	3,150,594	3,292	94,741,599	3,972	97,892,193
1999	557	778,514	3,205	93,964,177	3,762	94,742,691
2000	421	1,089,292	3,666	121,950,617	4,087	123,037,909
2001	270	2,415,765	4,203	127,597,821	4,473	130,013,586
2002	216	1,180,942	3,927	117,030,100	4,143	118,211,042
2003	223	986,696	4,092	131,401,537	4,315	132,388,233
2004	236	1,151,310	4,317	189,754,244	4,553	160,905,554
2005	269	1,997,996	4,317	143,497,864	4,586	145,495,860
2006	324	1,896,046	4,476	139,559,130	4,800	141,455,776
TOTAL	3549	16,297,759	38,727	1,220,690,426	42,276	1,236,986,185

Figures for 2006 are provisional. *GRT in the table refers to Gross Registered Tonnage.
Source: NPA Statistics Department.

within the maritime sector in Nigeria.

RECOMMENDATIONS

It is therefore, revealed that the course of running shipping business is capital intensive, and no single individuals can afford to provide the needed capital to purchase the required numbers of various vessels in Nigeria. However, the prospect is brighter now with the consolidation of the banks. There could be a sort of consortium to pool resources together for vessel acquisition for the cabotage trade. NIMASA is equally contemplating to invest heavily on vessels. Therefore, the following recommendations are worth considering:

First and foremost the government should motivate local maritime investors by providing effective funding because the business requires enormous amount of money. Hence, no matter the laws or policy in place, without proper funding and support from the government and other agencies, no positive result will surface.

Secondly law should not just be made of the sake of increasing the numbers of legislation by the government. There should be proper enforcement of the law. Enforcement also entails that the laws should be clarified to all stakeholder. While creating laws that are favorable to the nationals, law makers should also see to it that the indigenes are capable of managing the system; otherwise the industry could be placed at a higher risk, which can have a snowball effect on the economy.

Thirdly, there is a need for the nation to invest heavily in technology and technological knowhow. These are areas that have enabled foreign companies to be ahead of the National companies from a competitive point of view. The foreign vessels are more technologically inclined and they have sufficient number of experts to keep the vessel afloat. Therefore the government should

not overlook this point as one of the constraining factor to the growth of indigenous maritime entrepreneurs. More than that, the government should also invest in upgrading most of the port facilities and cargo handling, in addition to more investment in information technology.

Fourthly, there should be an affective training and development of human resources of the indigenous corporations. No workforce can excel without proper training and development. Training can be provided through short courses on maritime business. Additionally, local seamen can be sent on sabbatical abroad to acquire some additional knowledge and skills. Moreover, coaches and mentors from India and other part of Asia can be invited to come and mentor prospective entrepreneurs and employees of the local maritime corporations on the basis of the South-South co-operative initiatives. Training and development will also include proper forecasting and planning of manpower requirement by the industry.

Finally, the country must invest enormously in ship building. Without this, the nation will just continue to be a follower and not a pace setter as far as the maritime business is concern. A nation like India has gone far in the maritime arena owing to her huge ship building factories at Cochin. Therefore Nigeria can emulate India by setting up an industrial city for ship building. Indeed, if the nation is serious about the indigenization of the maritime industry, she must first and foremost start by manufacturing ships locally.

Conclusion

The contention of NNPC and other Multinational National Companies is that the indigenous operators do not have sea-worthy vessels. They posited that the Nigerian vessels do not meet up with their safety, health and

environmental standard. However, the Cabotage Act maintains that ships should be built, owned and if possible maintained by Nigerians. Therefore, how can the laws function effectively if ships owned or built by Nigerians are considered substandard by multinational companies for other reasons? This also explains the reason why Nigerian vessels are not allowed to lift crude oil from Nigeria to abroad. However, with the new law, NNPC and its collaborators should now clarify things to Nigerians.

The truth remains that the magnitude of risk involved in moving this sophisticated goods abroad is quite high for an average Nigerian vessel. The negative aspect is that the Japanese and Singaporean vessels have been flooding Nigeria with illegal goods in the face of the Cabotage law. With this reality, one wonders whether the law is still worth the paper on which it was framed. Nevertheless, if the above postulates are taken into consideration, the nation could achieve a milestone in terms of promoting indigenous participation in the maritime industry in Nigeria.

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Full Length Research Paper

Deciphering the social costs of Social Networking Sites (SNSs) for university students

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This study describes the impact of social networking sites (SNSs) on the studying habits of students; as such, multistage sampling technique was used for data collection. In the first stage, six universities (four public and two private universities) were selected as samples on simple random sampling basis, from which 1000 students were selected as the sample of the study using cluster sampling technique. Four main clusters/faculties, that is, Management Sciences/Business, Social Sciences, Natural Sciences and Engineering, from each university were selected for data collection. It was decided that the minimum number of faculties present for data collection should be two to make a university eligible for selection as a sample. A questionnaire was used as a tool for data collection. Out of the samples, 73% responded back. The fact explored is that despite the use of social networking sites, students can balance their time between studies and their usage of these sites, and can sustain good studying habits to maintain their academic performance. Hence, usage of these networking tools does not adversely affect the studying habits of the student users.

Key words: Internet, social networking sites (SNSs), students, academic performance, studying habits, Pakistan.

INTRODUCTION

Human life has seen enormous revolutions since its evolution. If a person belonging to the 18th century is given birth to again and he is given a task to see the changes that human life has seen, such a person would surely not accept that he is in the same world. The changes that were witnessed in the world since the last century have changed the world drastically. If we search for cornerstone for all the changes, the main source that everyone would agree upon is change in technology. Technology has changed the world rapidly from what it had been before. Out of various technological changes, the most valuable and dynamic is evolution of the internet. Internet has not only changed the professional life of humans, but has also changed the human personal and social life with the advent of the internet. Now, internet has become a part of one's life today. It has surrounded our lives so rapidly that it is beyond the imagination of human mind. No one can imagine that a network developed for U.S military in 1969 (Nethistory.info)

would become a tool to browse information, music, movies and games on almost every topic of the world that a man can even think of. It has become the best medium to explore the vast wealth of knowledge, used as an entertainment medium to link oneself with others in all parts of the world, and many other purposes that can be of one's imagination. Out of the most benefits one can get from the use of the internet, the most significant are that of communication benefits. Significance of the internet as a communication and connection tool is beyond description. Today, two-third of the world's internet population visit social networking or blogging sites, accounting for almost 10% of all internet time (Blog.nielsen.com), and 42% of internet users are registered on at least one social networking site (Socialadblog.com).

Social networking sites are a web provision where millions of people can join together to form an online community and hence, millions of communities form a social network to share knowledge, information and even culture (Nethistory.info). The idea of social networking originated in 1995 and gave birth to an early social network called Classmates. This was created to keep

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students in connection even after leaving the school or class (Classmates.com). In 1997, another SNS "SixDegree.com" was released and then this development carried on with the emergence of other social networking sites, such as: Cyworld (2001), Friendster (2002), Skyblog (2002), Orkut (2004), Myspace (2005), Yahoo 360 (2005), Twitter (2006) and Facebook (2006) (Social networking sites and its positive effects).

Face book being the latest of all the sites that have emerged has been the biggest and most successful of all social networking sites. While going in the foundation stones of Facebook, early steps were taken in 2003 when Mark Zuckerberg, the founder of Facebook, created a site called "Facemash" while he was a student at Harvard's School. When the school's administration noticed it, they immediately shut it down because of privacy breaching charge against him. After they dropped charges, Mark Zuckerberg recreated the "The Facebook" in February 2004. In 2005, it was named "Facebook" by dropping "The" from its URL (www.webhostingreport.com); and now Facebook is a social networking website with more than 500 million active users in July 2010. Numbers of its users are increasing tremendously over time, that is, 100 million users in August 26, 2008 and 500 million users in July 21, 2010. Moreover, it had 153% growth during the past year (Blog.Facebook.com).

While looking at the outcomes or returns these sites are offering, social networking sites have made the life a connection and network. Presently, we are linked with the whole world through one site, in that we can now share what we want to. At the moment, these sites have converted the world from a global village to a social global village or a social globe. We can communicate with others while sitting in our room and look for their networks. These sites have offered enormous benefits personally, professionally and socially as well. However, having only benefit for the society is an unrealistic thing to imagine no matter what. Same is the case with these networking sites. Along with offering countless benefits, these sites are also having some social evils as well. These sites are increasing the links and networks beyond the boundaries. Although these are positive, they have reduced the bonds of relations. The most important strength of users that is getting strength day by day is student class. These are the individuals who are always looking for new links and relations. This age group is increasing its time on the networks and relations, and they are deviating from their core aims of being good students. It has been observed that students spend more time on these sites on the cost of their studies and academic performance.

This tremendously increasing rate of users is an alarming situation for academicians, researchers, parents and students as well. Percentage of adult internet users (18 to 29 years) who use any SNS was 16% in September, 2005, while it was 86% in May, 2010

(www.marketingcharts.com). In Pakistan, like other parts of the world, users of these networking sites are increasing tremendously. Among the Asia's top ten internet countries, Pakistan ranked 7th with 17.5 million internet users (Internet users in Pakistan hit 17.5 million mark) and 50% internet users use online social networks (www.pewglobal.org). These students, like other students, spend much time on these sites rather than spending that time on their academic activities. Consequently, they might suffer academically or in their studying habits. So, this is the area that requires attention from researchers. This study is aimed to fill that gap. This research specifically targets the Pakistani students and targets the impact of using social networking sites and academic performance and studying habits of students. This study will be a value addition to the body of knowledge as it is an "unexplored area" in Pakistan. Therefore, exploring this would provide a profound insight on impacts of social networking sites in this regard.

LITERATURE REVIEW

The world has seen many changes due to rapid changes in technology. Out of the technological changes, evolution of the internet is the most significant of all. Internet usage has change the way the world interacts, acts and performs various tasks. It has changed human social, personal and professional life drastically. There has been a debate over incidences of abuse on the internet and it takes a more serious form when it is about teenagers. Even the alarming rate of such incidents is promoting regulations for internet use among teenagers. Students are of the most influenced class of all users of internet.

Students are considered as the social capital/asset for a nation, and the type of social capital a nation possesses is heavily dependent upon the youths of a nation (Pasek et al., 2006). Shah et al. (2001) found that informative use of internet has a positive relation with indicators of social capital, while recreational use has negative impact on social capital. Oskouei (2010) found that informative use of technology not only increases productivity of students, but also teachers who are building and reshaping the social asset/capital. Students are the social asset for the nation on the whole. Coleman and James (1988) defined social capital as the resources accumulated by using the direct relationships of people. Students contribute to prosperity of their institute and ultimately have an influence on the economy as well. It is practically constructive to measure all those activities that have positive or negative influence on the students and their academic performance. Tuckman (1975) while considering the determinants of student academic performance concluded that apparent demonstration of knowledge, understanding, skills, concepts, and ideas can be labelled as performance and their grades are the

outcomes of their performance. While considering the factors affecting the academic performance of students, internet and technology is considered as one of the important variables. As noted by Shah et al. (2001), positive use of internet has a positive effect on students, while recreational use has a negative impact. Similarly, Oskouei (2010) found that internet is not only beneficial for students but equally important for teachers to create and disseminate knowledge. So internet application can be of practical importance and can be used for educational institutions. The contemporary use of internet is seen in the shape of social networking sites (SNSs) that are widely and rapidly accepted through out the world.

The first official social networking web site was Classmates.com which was founded in 1995. This was created to keep students in connection even after leaving the school or class (classmates.com). In 1997, another SNS "SixDegree.com" was released and then this development carried on with the emergence of Cyworld (2001), Friendster (2002), Skyblog (2002), Orkut (2004), Myspace (2005), Yahoo 360 (2005), Twitter (2006) and Facebook (2006) (Social networking sites and its positive effects).

There are over 100 social networking sites available online with millions of users. Facebook has 500 million members; MySpace.com (130 million members); LinkedIn.com (75 million members); Friendster.com (90 million members); Stumbleupon.com (over 10 million users); Orkut.com (membership of 100 million); Classmates.com (50 million members); Meetup.com (2 million members); Xanga.com (27 million members); Care2.com (Over 9 million members) and Ryze.com (500, 000 members).

Other social networking sites include: Bebo, BlackPlanet.com, Flickr.com, Reunion.com, aSmallWorld, Bebo, BlackPlanet.com, Blue Dot, Bolt, Broadcaster.com, Buzznet, CarDomain, Consumating, Couchsurfing, Cyworld, Dandelife, DeadJournal, DontStayIn, Doostang, Ecademy, eSPIN, Faceparty, Flickr, Flirtomatic, Fotki, Friends Reunited, Gaia Online, Geni.com, GoPets, Graduates.com, Grono.net, Hyves, imeem, Infield Parking, IRC-Galleria, iWiW, Joga, Bonito, Last.fm, LibraryThing, LiveJournal, LunarStorm, MEETin, MiGente.com, Mixi, MOG, Multiply, My Opera Community, myYearbook, Netlog, Nexopia, OUTeverywhere, Passado, Piczo, Playahead, ProfileHeaven, Pownce, RateltAll, Reunion.com, Searchles, Sconex, Shelfari, Soundpedia, Sportsvite, Studivz, TagWorld, TakingITGlobal, The Doll Palace, The Student Center, Threadless, TravBuddy.com, Travellerspoint, Tribe.net, Vampire Freaks, Vox, WAYN, WebBiographies, Windows Live Spaces, Woophy, XING, Xuqa, Yelp, Zadz and Zoomr (www.selfgrowth.com).

Two-third of the world's internet population visit social networking or blogging sites, accounting for almost 10% of all internet time (blog.nielsen.com) and 65% of internet usage (www.socialadblog.com). "Social networking sites,

which allow users to build or be part of online communities, account for 44% of the America's internet traffic" reported by a consulting firm, Juxt Consult Research and Consulting Pvt. Ltd (www.livemint.com). More than 145 million people worldwide logged onto at least one of the 20 most-visited social networking web sites (www.scribd.com). The study of 1,200 students found that 96% use social-networking sites and 81% visit a social-networking web site at least once a week (www.scribd.com).

Facebook is one of the most widely used SNS. It has more than 500 million active users in July 2010. In September 2005, Facebook started on its high school version by taking advantage of its popularity among students. The number of its users is increasing tremendously over time, that is, 100 million users in August 26, 2008 to 500 million users in July 21, 2010. However, it had 153% growth during the past year (blog.Facebook.com). Facebook has become an obsession for young people, in that they try to sign in their Facebook account as soon as they get connected to internet. Zuckerberg (2009) found that Facebook users accounted for 16% of 14 to 22 years old in 2006 and 40% among that same population in 2008. Other social networking sites, including Friendster.com (about 50%), Orkut (about 41%) and Bebo.com (about 32%) have particularly demonstrated strong growth (Social Networking Explodes Worldwide, Facebook User Base up to 153%). Twitter is now attracting 190 million visitors per month and generating 65 million tweets a day (techcrunch.com). Despite many social networking sites before Orkut and many more coming into the fray later on, the reign of Orkut was not threatened by good and obvious reasons. However, Orkut has remained a favourite for more than 650,000 users, worldwide (ezinearticles.com).

Impact of SNS on students

Using SNS and its various impacts have been a topic of great discussion among various researchers throughout the world. Numerous studies have been conducted to see the positive and negative impact of these sites on its users. These findings strengthen both the positive as well as negative views about these sites.

Many researchers have identified various costs associated with the usage of SNSs. For instance, Cassidy (2006) found that social networking sites were used for competition to know the number of friends one can acquire and how quickly he can accumulate them, and ultimately how many friends they share. The number of users is multiplying each day considerably, so a number of these students spend their valuable time on this activity rather than on their study activities. These studying habits are associated with the academic performance or grades a student gets. As Thomas et al. (1987) clearly

depicted that the grade-related differences among students are correlated with the study activities of a student, Suhail and Bargees (2006) proclaimed that many problems of educational, interpersonal, physical and psychological nature can occur due to excessive internet usage. According to Karpinski (2009), collegiate grade point averages (CGPA) and Facebook use have negative correlation, that is, 3.0 to 3.5 for users versus 3.5 to 4.0 for non-users. Even 79% of Facebook members did not suppose that their GPA was associated to their networking habits. Miami CBS affiliate declared that Facebook usage may yield lower grades (CBS4, 2009). However, it was proclaimed by www.myfoxdfw.com that Facebook deteriorates grades.

Wilson (2009) discussed that academic research has validated the nagging suspicions of many such students that Facebook is having a detrimental effect on their university results. Another related coverage was made by Khan (2009) that students using Facebook show poor performance in exams. Internet usage has a negative and momentous impact on academic performance, and the destructive usage of the internet outweighs the productive dimensions (Englander et al., 2010). The striking and pathological boost in internet usage has produced internet addiction in its users. Nalwa and Anand (2003) found that addicted users setback their jobs to use internet, experienced with sleep loss. Hence, they waste their precious time ignoring the important jobs including academic responsibilities. Kirschner and Karpinski (2009) found that Facebook users had lower GPAs and they spent lesser hours per week for their studies than the nonusers.

Karpinski (2009) said that every generation has its own distraction, but the study thinks Facebook is a unique phenomenon, in that Facebook affects the grade point average (GPA) of the students adversely. A research was conducted at the American Educational Research Association. On its annual conference (21st centuryscholar.org) in San Diego, California (2009), it was declared that students who are users of internet social networking sites had lower grades because they study less.

Baroness Greenfield, director of the Royal Institution, said, "Internet-obsessed children are losing the ability to concentrate and communicate away from the screen". This leads to lower performance in academics (leaderswedeseerve.wordpress.com). Dr. Himanshu Tyagi, a psychiatrist at West London Mental Health Trust, proposed that teenagers start living their lives vigorously online and in this way they value their own "real" lives less, which include education (www.telegraph.co.uk). Tim Pynchyl, Associate Professor of Psychology at Carleton University, emphasized on more destructive dimensions of social networking sites, and argued that using Facebook can lead to distraction and procrastination (www.psychologytoday.com). Banquil and Burce (2009) proposed that social networking sites directly causes the gradual drop of grades of students. Boogart and Robert

(2006) proposed that usage of social networking sites, for instance Facebook, has brought negative implications on students' academic performance, such as lowered GPA. Similar findings were given by Grabmeier (2009) when he found that the students who sign up for the SNSs had lower GPA as compared to non-users.

Along with the academic effects of usage of SNSs, there has been a debate over incidences of abuse on the internet and it takes more serious form when it is about teenagers. Even the alarming rate of such incidences is prompting regulations for internet use among teenagers. Mattingly et al. (2010) proposed that the issues of privacy, identity protection, and e-professionalism are also to be considered while using these sites; but Sengupta and Chaudhuri (2010) found that there is no association between SNSs memberships and online abuse of teenagers.

There are also some arguments in favor of using more internet as they proposed that greater use of internet has a positive impact on students' academic performance. Linda et al. (2006) found that children using internet more got higher scores on reading skills' tests and also had higher GPA than the children using internet less. Ellison et al. (2007) suggested that Facebook usage may help people cure some psychological problems such as low self-esteem and low life-satisfaction.

Roblyer et al. (2010) explained that SNSs are a brilliant source of interaction between students and faculty members. Shah et al. (2001) emphasize on types of internet use. They proposed that informational use of internet has a positive association with the indicators of social capital while social-recreational use of internet has a negative association with the civic indicators (civic engagement, interpersonal trust, and life contentment) of social capital. Pasek et al. (2006) suggested that a site-specific culture is induced by a particular website that can either positively affect the building of social capital or negatively hinder the social capital building. They further found no positive correlation between the use of Facebook and lower grades of the students, rather they found Facebook to be more commonly used among students having higher grades. They concluded that there was no difference in the academic performance among users and non-users of Facebook.

Kolek and Saunders (2008) concluded that there is no association between Facebook usage and GPA of students. Kubey et al. (2001) found that the greater use of synchronous communication applications, such as chat rooms and SNSs are correlated with internet dependency and impairment of academic performance. Becoming a part of a particular community is the core functionality that a user draws from a SNS. To examine whether this functionality affects the student to complete his degree or not, Lovitts and Nelson (2000) proposed that the successful completion of Ph.D. is highly correlated with a strong integration of students into their departments' social and professional life. Keeping in view the contrasting findings of the researchers in the foregoing, this study

Table 1. Personal information of respondents.

Variable		Frequency	Percentage
Age	17-22	603	83.05
	23-28	113	15.56
	29-34	5	0.06
	35-40	5	0.06
Gender	Male	463	63.8
	Female	263	36.2
Degree	Bachelors	282	38.8
	Masters	423	58.3
	M. Phil	21	2.9
Type of Institute	Private	126	17.35
	Public	600	82.65
Discipline	Social sciences	160	22.0
	Management sciences	312	43.0
	Natural sciences	105	14.5
	Engineering	149	20.5
Year of degree	1st	237	32.6
	2nd	204	28.1
	3rd	142	19.6
	Final year	143	19.7

explores the effects of SNS' usage on studying habits of university students in Pakistan.

METHODOLOGY

The study is purely designed to study the impact of these social networking sites on the students. Students are one of the most rapidly increasing users of these sites and they have the highest customer segment.

Another rationale for selection of this segment is that in Pakistan, 37% of the total population having both the highest literacy rate and users of internet also belong to this portion of the population. One thousand students from different universities of Pakistan were selected for this study. This selection was done using multistage sampling technique. In the first step of sampling, simple random sampling technique was used, through which 6 universities (4 from the public sector and 2 from the private sector) were selected. In the second stage of sampling, these universities were divided into clusters, and each cluster has four faculties, that is, Faculty of Business, Faculty of Natural Sciences, Faculty of Social Sciences and Faculty of Engineering. In the last stage, simple random sampling was again used when personally administered questionnaires were used for data collection in those universities. A total of one thousand questionnaires were distributed out of which 730 questionnaires were received back, which were complete in all sense. Most parts of the questionnaires were taken from the research work of Raizada et al. (2009) and Banquil et al. (2009).

As the questionnaire was customized according to the needs of the research, reliability of the questionnaire was required to be

found as 0.762, which was a quite acceptable value that makes the questionnaire worth using. The data collected from these questionnaires were then analyzed using SPSS 17.0.

FINDINGS OF THE STUDY

Table 1 shows various demographical factors of respondents of the study. The findings show that most of the respondents belonged to the age group of 17 to 22 years (83% of the respondents). So, this study shows the results considering this portion of the sample. While considering the gender of the respondents, majority of the respondents were male (63.8%) and the rest were female (36.2%). Both the genders represent a good strength, so findings can be attributed to both sub categories. While looking at the latest/last degree of the respondents, majority of the respondents were students of Master degree (58.3%), the second most important strength was 38.8% which was represented by students who were studying at Bachelor level. Only 3% of the students were representing the students who were students of post graduate level/M.Phil. Most of the respondents were from the public sector universities (82%). When respondents were divided with respect to their discipline, the major portion was represented by Management Sciences with 43%, Social Sciences with 22%, Engineering

Table 2. Internet and SNS usage.

Variable		Frequency	Percentage
Time spent on leisure activities (h)	1-3	317	43.7
	4-6	269	37.1
	7-9	70	9.6
	> 9	70	9.6
Mostly involved leisure activity	Sports	98	13.5
	Internet	347	47.8
	TV	171	23.6
	Others	110	15.2
Extent of internet usage	Seldom	135	18.6
	Once in a while	102	14.0
	Weekly	131	18.0
	Almost everyday	358	49.3
No. of hours spent on internet	1-3	519	71.5
	4-6	153	21.1
	7-9	29	4.0
	> 9	25	3.4
Basic purpose of internet usage	Chitchat	141	19.4
	Educational purpose	284	39.1
	SNS	109	15.0
	Informational use	192	26.4
SNS usage	Yes	492	67.7
	No	235	32.3

22%, Engineering with 20.5% and Natural Sciences with 14.5% of the total respondents. Majority of the respondents were in the first year of their degree (32.6%), 28% were in their second year of degree, while students who were in their third year and final year of degree represented 19.6 and 19.7%, respectively.

Table 2 shows various aspects regarding SNS usage. When students were asked about the time spent on leisure activities, majority of the respondents (43.7%) were spending 1 to 3 h for leisure activities and 37% were spending 4 to 6 h on leisure activities on daily basis. Very small numbers of students were spending 7 to 9 h, or above 9 h on leisure activities, that is, 9.6% each. Students were also asked about the leisure activity they like the most. The most attractive leisure activity in which students involve themselves is the use of internet, as 47.8% of the respondents mentioned that they use internet as leisure activity, while sports and watching TV were used by 13.6 and 23.6% of the respondents. However, 15.2% of the respondents were using any other medium used for leisure activity other than internet, TV or sports. Students were found to be involved in leisure activities on regular basis, as the findings of Table 2 also

show the extent of internet usage. Almost half of the respondents (49.3%) claimed that they use internet on regular or daily basis; but the students who use internet weekly, seldom or once in a while were collectively half of the representatives. So this claim strengthens the view that there is rapid increase in the number of users of internet in Pakistan, and students are one of the regular customers who use internet in Pakistan. Similarly, this claim strengthens the view given in the upper question that internet is the most commonly used median for leisure activities.

When students were asked about the amount of time spent for internet, the maximum number of users (71.3%) mentioned that they spent 1 to 3 h on the internet. These findings are quite consistent with the findings where maximum respondents claimed that they spend 1 to 3 h for leisure activities. However, the mostly adopted and used medium for leisure activities is the internet. Only 21% of the respondents reported that they used internet for 4 to 6 h a day, while 7.4% reported that they used internet for 7 to 9 h or above. While asking students about the basic purpose of internet usage, the findings gave an interesting direction as majority of the respondents

Table 3. SNSs activities and extent of involvement.

Variable		Frequency	Percentage
No. of social networking sites used	1	194	38.8
	2	189	38.0
	3	51	10.3
	≥4	64	12.9
Most visited social networking Site	Facebook	455	91.3
	Twitter	17	3.4
	Orkut	11	2.2
	Others	15	3.0
Time spent on social networking sites (h)	1-3	375	75.3
	4-6	97	19.5
	7-9	14	2.8
	> 9	12	2.4
Purpose of using social networking sites	Being connected to friends	366	73.5
	Join educational communities	68	13.7
	Find employment	35	7.0
	Others	29	5.8
Addiction to social networking sites	Disagree	240	48.1
	Indifferent	120	24.1
	Agree	138	27.8
Costs of SNS usage	Privacy threats	109	21.9
	Time wastage	340	68.3
	Emotional disturbance	49	9.8

respondents were using internet for other than educational purpose, that is, chitchat (19.4%), to connect SNS (15%), and for informational use (26.4%). Students who were using internet for educational or learning purpose were only 39.1%. These claims further strengthen the view that students' usage of the internet is the most adopted media for leisure activities and it is not primarily used for educational purpose. When the respondents were asked whether or not they were using SNS along with internet, majority of the respondents (67.7%) were found to have been on these sites, but only 32.3% were non-users of social networking sites.

Table 3 shows the extent of SNS usage among students. When students were asked about the number of social networking sites they visit, it was found that majority of the students were restricting themselves to using only one or two social networking sites, that is, 38.8 and 38%, respectively. Very few students were using 3 or above 3 sites (10.3 and 12.9%, respectively). So students were inclined towards one or two sites of social networking. The next question that was asked was about the preferable SNS. It was observed that 91.3% of the respondents mentioned that they use Facebook as the

first medium of social networking links, so this finding strengthens the claim that Facebook is the most liked and most rapidly growing social networking site among students. Very few students were observed to be using any other social networking sites, that is, Twitter, Orkut or any other (3.4, 2.2 and 3% respectively). So it can be claimed that the favourite social networking site for Pakistani students is Facebook. Since they are more attracted towards its usage, they will prefer to use Facebook as a leisure activity than any other site or medium of leisure activities, as students use internet and social networking sites for leisure activities. Students were again asked for the time spent on SNS. The finding was found to be consistent with the view that was established from the findings of Table 2, where students claimed that they spent 1 to 3 h for leisure activities, and their favourite medium of leisure activities was the internet. Again, majority of the respondents showed that they spent 1 to 3 h on the internet and they use it for non-academic activities rather than for studies. Nonetheless, 75.3% of the respondents were spending 1 to 3 h on these sites, and very few of them were using social networking sites from 4 to 6 h, 7 to 9 h or above 9 h (19.5,

Table 4. Academic costs of SNSs.

Variable		Frequency	Percentage
No. of hours spent on studies	1-3	391	64.7
	4-6	165	27.3
	7-9	32	5.3
	More Than 9	16	2.6
Extent of studies	Daily	251	41.6
	Weekly	212	35.1
	Monthly	25	4.1
	Near exams	116	19.0
Doing assignments	Immediately	109	18.0
	Before deadline	262	43.4
	Just before deadline	214	35.4
	After deadline	19	3.1
Preference of SNS over studies	Disagree	337	55.8
	Indifferent	141	23.2
	Agree	126	20.7
Distraction from studies	Disagree	258	42.7
	Indifferent	168	27.8
	Agree	178	29.5
Enjoy time spent on studies	Disagree	122	20.2
	Indifferent	166	27.5
	Agree	316	52.2
Love for learning	Disagree	87	14.4
	Indifferent	135	22.4
	Agree	382	63.2
Balance time between studies and SNS usage	Disagree	109	18.0
	Indifferent	104	17.2
	Agree	391	64.6

2.8 and 2.4%, respectively).

As the findings of Tables 2 and 3 suggest that the most significant use of internet is leisure activities or activities other than academic purpose, it was observed that the respondents use internet for social networking. Also, it was observed in these tables that students were asked about the purpose of using SNS, majority of the respondents (73.5%) were using social networking sites for social connection or interaction with friends, while very few of them were using these sites for educational communications (13.7%), which strengthens the view that internet and social networking sites are purely used for non-academic purpose. Table 3 also presents students' responses toward the effects of these sites on them. It was observed that 51.9% of the respondents either

agreed or were indifferent that they were addicted to these sites, while 48% of the respondents disagreed that they were addicted to these sites. Afterwards, students were about the social costs of these sites. Majority of the students (68.3%) agreed that it is mere wastage of time, 21.9% agreed that it is the privacy threat and only 9.8% showed that it as a result of emotional disturbance. Table 4 shows the impact of SNS usage on students' studying habits. Students were asked about the time they spend on social networking sites. Majority of the students (64.7%) responded that they spend 1 to 3 h on using social networking sites. These findings are consistent with those which show that students use internet for 1 to 3 h a day; moreover, the most widely usage of internet is social networking sites. This result also shows that students

use internet as a source of leisure activity via the use of SNS. Nonetheless, 27.3% of the respondents claimed that they are using these sites for 4 to 6 h a day; but the students who use these sites 7 h a day or above are only 7.9%.

When students were asked about what the extent of their studies is, 41.6% of the respondents answered that they are regular in their studies and that they perform their academic tasks on daily basis, while 35.1% of the respondents claimed that they study on weekly basis, but only 23.1% responded that they study monthly or close to exams. So this table shows that students are managing their studies as well, along with using these sites on regular basis. So there is no significant effect on the studying habits of the students.

However, different results were observed when students were asked regarding the assignments and study tasks they were assigned. Majority of the students were completing their study tasks before deadline or just before deadline (43.4 and 35.4%, respectively), but very few students (18%) were performing their study tasks immediately after assignments of their tasks, and only 3.1% of the respondents were not fulfilling their tasks within the given time.

Students were also asked whether or not they prefer these sites over their studies if they were given the opportunity and time to do so. Most of the students (55.8%) were not willing with the statement, as they were found to spend their time for studies rather than using these sites.

These findings contradict with those given in Table 1 in which it was found that students like to spend most of their time on leisure activities. 43.9% of the respondents either agreed or were indifferent with the statement. Another query was whether or not these sites create any sort of distraction from students' studies? Findings showed that 42.7% of the respondents were found not to have any sort of distraction from their studies due to the use of these sites, but 57.3% of the respondents were either willing or indifferent that these sites have any impact in shaping the distraction from their studies. Students were also asked to respond to their feeling for the studies and learning.

The result shows that majority of the students enjoy spending their time on studying and they love to learn (52.2 and 63.2%, respectively). Findings also show that very few of the students do not enjoy spending their time on studying or have the eagerness to learn. So, findings give the direction that students like to spend their time on leisure activities (Table 1), but they also love to and are eager to learn (Table 3). On the basis of these findings, the next question that was asked was whether or not students are able to balance their time between studies and the use of these social networking sites.

Here, findings are interesting as 64.6% of the respondents were confident that they can balance their time between studies and the time spent on SNS, while only

only 18% were not able to balance their time between studies and the use of these sites. Moreover, only 17.2% were not indifferent.

So, it can be eventually concluded that there is no significant relation between SNS usage and students' studies. These findings are quite consistent with those of Sengupta and Chaudhuri (2010), Pasek et al. (2006) and Kolek and Saunders (2008).

Conclusion

The findings of this study give interesting results as students are able to maintain their studies and there is no significant effect of using social networking sites on the studying habits of the students. Students were found to be more inclined towards leisure activities and the most attractive leisure activity for students is the internet. Results also suggest that the wide use of the internet is SNS. The study reveals that students use these sites for non-academic activities rather than for academic activities. So it can be claimed that students are more inclined towards non-academic activities, that is, internet or SNS. As such, excessive usage of SNS might affect their studying habits. Conversely, the actual results give a different direction, in that students were found not to be disturbed by these sites, rather they were able to perform their tasks appropriately, and they were meeting their study tasks within stipulated time. When inquiry was made to further identify why excessive usage of these sites did not affect students' studying habits, it was found that they were capable enough to manage things and were able to balance the things in the best befitting manner. Similar results were found by Sengupta and Chaudhuri (2010) where they showed that SNS usage did not have a significant effect on the students. Pasek et al. (2006) also found that there is no positive relation between the use of Facebook and lower grades of the students; rather they found Facebook to be more commonly used among students having higher grades. In addition, Kolek and Saunders (2008) concluded that there is no association between Facebook usage and GPA of students.

CONTRIBUTION AND FUTURE IMPLEMENTATION

According to Nielsen Research Company, the global time spent on social networking sites is increasing at a rate of 82% per year. It has been a sizzling issue whether internet and SNS' usage is a rich source of interaction and up-to-date information for the students or if the darker aspects of this usage outweigh its benefits. This study will add value to the existing body of knowledge; moreover, as it is an "unexplored area" in Pakistan, it would provide a profound insight on impacts of social networking sites in this regard. This research would give

an insight of the status of usage of social networking sites and their perceived impact on the studying habits of students. Findings of this study have much importance for academicians, practitioners and parents, as these are all stakeholders and have direct interest in students. This study reveals that students are using social networking sites for non-academic purpose, but still, they are managing their studies and educational tasks. There should be proper arrangement made for proper use of these sites. For this purpose, mentoring should be done and students should be trained for the positive outcomes of using these sites. This in return would offer greater returns in shaping more learning and improved academic performance.

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Full Length Research Paper

Credit and thrift co-operatives in Nigeria: A potential source of capital formation and employment

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Unemployment is a major challenge in Nigeria and many other developing countries. There is unemployment among professionals and non-professionals alike, there is unemployment among young school graduates, experienced professionals, tradesmen, and non-skilled workers in Nigeria. The consequences of unemployment in Nigeria are grave and may be classified as social and private. They include increase in crime rates, loss of potential output, poverty, and loss of potential tax revenue due government, professional studentship and family instability. In Nigeria, as in some other developing countries, job losses by households' heads have negatively affected some homes, leading to family disintegration. Unemployment can explain the rising trends of female headed households in Nigeria. One major source of unemployment in Nigeria is insufficient capital for investments. The Harrod-Domar (neo-classical) theory encourages savings as a source of capital formation for investments with the consequent employment generation. This work identifies co-operative credits and thrift associations as a veritable source of capital formation which is required for investment purposes. The thrift cooperative as a micro finance agency is also a direct source of employment for those engaged in its management or coordination.

Key words: Co-operatives, thrift and credit societies, unemployment.

INTRODUCTION

Unemployment is a major challenge in many developing countries including Nigeria. Unemployment breeds a lot of private and social consequences which are negative (Alam et al., 2009; Alam, 2009). These include poverty, crime, social inequality, loss of output, family disintegration, among others. Governments all over the world concert efforts to mitigate this problem (Alam, 2009). In Nigeria, several efforts have been made to create jobs for the teeming able bodied people who are available for work but who are yet to find jobs (Goodluck, 2011). One key source of unemployment in Nigeria is dearth of capital required to combine with other factors of production, which are, land, labour and entrepreneurship (Nieman et al., 2003). Credit and thrift societies constitute a source of capital formation and employment generation. According to Harrod and Domar (1957), savings mobilization and

subsequent investment is the key to economic growth and development

Problem statement

The loss of employment of households' heads in Nigeria has negatively affected some homes, leading to family disintegration. Unemployment is responsible for the rising rates of female headed households in Nigeria. One major source of unemployment in Nigeria is the lack of capital for investments.

Research questions

This paper intends to answer some questions and they are listed thus:

i. What are the reasons for the rising trends in unemployment in Nigeria?

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- ii. What is responsible for the paucity of capital for small businesses in Nigeria?
- iii. How can Nigeria as a nation and prospective investors overcome the deficiency in capital formation and mobilization?

Research objective

From the ongoing, this study attempts to identify co-operative organisations as veritable sources of funding for investments. In addition, the objective of the research is to show how co-operative organizations stimulate capital formation and mobilization within a country. The paper will also touch other pertinent factors that impacts employment generation in Nigeria.

LITERATURE REVIEW

Definition of concepts

Generally, a cooperative may be defined as an association of persons who pool their resources together on mutual basis to solve specific socio-economic problems, which may include income generating activities. A co-operative may also be defined as a self help organization.

These associations may be formed by either producers or consumers.

The initiative to form such cooperatives usually arises from one or two people. These initiators then play an advocacy role and enlist other people to the co-operative. Often, the initiators become the key drivers of these projects and reap the consequent benefits as managers of these ventures.

There are several types of co-operative societies in Nigeria. These include:

- i. Multipurpose co-operative societies
- ii. Marketing co-operative societies
- iii. Consumers co-operative societies
- iv. Processing co-operative societies
- v. Industrial co-operative societies
- vi. Supply/purchasing co-operative societies
- vii. Credits and thrift co-operative societies

Co-operative societies in Nigeria operate at three levels: the primary, secondary and tertiary. The primary societies operate at the level of a community, the secondary society operate at the level of the local government area, while the tertiary or apex co-operative organization operates across the local government areas but within the state.

Brief history

The origin of co-operatives in the world may be traced to eighteen century England. The co-operative was formed as a result of human sufferings and degradation during

the industrial revolution in England. The social impact of the revolution was pronounced and largely felt by the common man who needed to improve their conditions of living that had deteriorated to an inhuman standard. At that time, while employers were reaping high profits, employees were paid subsistent wages which remained very low in spite of rising cost of living (Ukpere, 2010). This affected the welfare of workers negatively, even the quality of food taken by workers was low (Bryce, 1996). It was as a result of these developments that the idea of co-operative movement was conceived by Robert Owen, who is often seen and referred to as the father of co-operative societies. Robert Owen advocated for self-supporting communities. Owen's initiative provided an example which was followed by the Rochdale Pioneers (a group of workers) who organized themselves into a movement for a new humanism based on self-help and group actions (Abia, 2000). However, Taylor (1974) traces the global origin of thrifts co-operative to the credits society formed by Herman Schulge – Delitzsch in 1851 to provide credit facilities to debt ridden peasant farmers in Germany.

In Nigeria, the first formal co-operative was formed in 1936. The first co-operative legislation known as co-operative societies ordinance No. 6 of 1935 was enacted in 1935. This provided the plank for the first Registrar of co-operative societies to be appointed with the mandate to promote, supervise and register co-operative societies under the ordinance.

Credit and thrift co-operative

The focus of this discourse is the co-operative and thrift society, which may also be referred to as the credits and thrift co-operative or the thrift and loans co-operatives. All such co-operatives perform functions that are practically related. The core function is to improve access to credits at critical moments or more succinctly, financial intermediation. Principally, such co-operatives aim at making it easier for people (especially people with low income) to save, thereby increasing the amount of money available for lending to members. Loans and credits are provided to members at much more traditional and easier conditions than the methods adopted by commercial banks and other financial institutions (Otto, 2006). The thrift and credits co-operative is the earliest of co-operatives to have been formed worldwide and also in Nigeria. According to Abia (2000), it was the bedrock of capital formation of the lower Cross River Region in Nigeria.

MODEL AND FUNCTIONS

Models of co-operative and thrift societies

There are several models of thrift societies which are

discussed further.

Rotating savings and credit associations (ROSCAs)

These are formed when a group of people come together to make regular contributions to a common fund, which is then pooled as a source of credits. The members of the group may be neighbours, friends, or colleagues at work. The group forum provides an opportunity for social interaction and is quite popular with women. These self-help groups may be classified under informal microfinance institutions. In Nigeria, the "Esusu" is also an example of the ROSCAs. "Esusu" is a revolving loan scheme in Nigeria and is entrenched in many West African countries as a source of credit and savings. Similarly, members in such a society make fixed contributions of money at regular intervals. At each interval, one member collects the entire contributions from all. The "esusu" is a programme that can assist people raise funds to execute projects including the expansion of capital for investment purposes.

The Grameen solidarity model

This model is based on peer group influence, and loans are made to individuals in groups. Group members collectively guarantee loan repayment, and access to subsequent loans is dependent on successful repayment by all group members. Payments are usually made weekly. These groups have proved effective in deterring defaults as evidenced by loan repayment rates attained by organizations such as the Grameen Bank, who use this model. Under the Grameen Bank variation of this model, groups contain 5 members and savings must be contributed for 4 to 8 weeks prior to receiving a loan. Savings must also continue for the duration of the loan term. Only two of the major group members receive a loan initially. After a period of successful repayment, 2 more members receive loans and after another period of successful repayment, the final members receive a loan. Ledger (1990) cited in Chuku (2010), highlight the fact that this model has contributed to broader social benefits because of the mutual trust arrangement at the heart of the group guarantee system. The group itself often becomes the building block to a broader social network (Nyele, 2011).

There is a need to critically examine this, as repayment is not always easy. Frustration of repayment in the scheme, always result to social decadence.

Village banking model

Village banks are community managed credit and savings associations which provide access to financial services, build community self-help groups, and help

members accumulate savings. They usually have 25 to 50 members who are low-income individuals seeking to improve their lives through self-employment activities. These members run the association, elect their own officers, establish their own by-laws, distribute loans to individuals and collect payments and services. The loans are backed by moral collateral, the promise that the group stands behind each loan (Chuku, 2010). The function of this type of cooperative therefore is financial intermediation; recycling funds from surplus spenders to deficit spenders. More specifically, the services include; (1) Savings mobilization and (2) Extension of credits and loans.

In practice, three forms of thrift and loan co-operations exist and are presented thus:

1. One category specializes in mobilization of savings among its various clients. These clients or members may be traders, commercial vehicle workers full time house wives among other especially low income earners.
2. Another category includes those specialized in entirely granting loans to their clients and other members of the public.
3. A third category involves those who mobilize savings and also extend credits to their clients.

Quite often, the average cost of borrowing from these co-operatives or loan associations by non-members, is higher than the cost of borrowing from commercial banks, but the ease of access to such loans and the personal touch between the contracting parties is a major attraction for many people. Consequently, a lot of people patronize these co-operatives and other non-bank financial houses. There is also a need to see the demerits of the micro capitalist views on it

Prospects

Given the high level of poverty in Nigeria and paucity of loan able funds, the patronage of these credit associations is very high (Ewubare, Aiie and Akekere, 2008). According to the last national living standard survey report published in 2006 by the federal office of statistics (also known as Nigeria Bureau of statistic), the poverty profile in Nigeria has become critical as shown in Table 1.

These figures clearly indicate that poverty is steadily increasing in Nigeria except for 1996, in which the report showed marginal improvement. Current data shows (using the World Bank standard of people living below \$ 1. or 2.00 daily) that the level of poverty in Nigeria is well over 72% and unemployment is steadily on the increase (Otto, 2009). So, the prospect of any business that will service and help to alleviate the plight of the poor is good. According to Todaro and Smith (2003), the marginal savings rate of the poor, when viewed from a holistic perspective are not small; this high volume of savings from the poor who usually constitute the target group of

Table 1. Distribution of population in poverty.

Year	Non poor (%)	Moderately poor (%)	Core poor(%)
1980	72.8	21.0	6.2
1985	53.7	34.2	12.1
1992	57.3	28.9	13.9
1996	34.4	36.3	29.3
2004	42.2	38.1	19.7

Source: Nigerian Bureau of Statistics (NBS), (2006).

credit co-operatives can be encouraged and efficiently mobilized for the benefit of the individuals, the co-operative and the entire economy.

The Governments in Nigeria as governments in many parts of the world are committed towards poverty emancipation and so, are likely to be less hostile but supportive of credit co-operatives. More succinctly, stringent tax imposition and adverse operational policies inimical to the progress of co-operatives are not likely.

Besides the needs and problems of the poor including emergencies such as unanticipated deaths of close relatives, school fees, rents, among others, are not likely to cease in the near future. These needs will constantly require attention whenever and wherever they occur. Co-operatives can thrive anywhere; be it in the rural area or urban. It is not constrained by infrastructural inadequacies as power supply and many other difficulties common in the rural areas. The credit and thrift association is a potential source of self employment for any individual or group of individuals with sufficient interest in such ventures. More so because the initial cost of setting up such ventures are not prohibitive.

Pitfalls

Given the level of indiscipline and corruption in Nigeria, any business that has to do with credits is potentially risky. Many Nigerians are also not disposed to meeting obligations such as school fees, house rents, electricity bills, to mention a few, when they are due. Hence, agent interested in extending credits should be willing to confront these challenges.

Registration requirement

Co-operative associations are registered with the states co-operative division of the ministry of commerce in the relevant state of domicile. The ministry may differ from state to state since co-operatives are governed through the specified laws of a state. For instance, the co-operative societies in Delta and Edo states are governed by section 7 (1) of the co-operative operatives' law, cap 45 of the Bendel state of Nigeria law of 1976 including all its amendments since then. In some states, the co-operatives division is in the Ministry of Trade and Industry

(for example, Rivers State). In Rivers State, as at 2004, there were over 500 registered co-operatives with several others operating without due registration. To operate legally as a thrift and credit co-operative, at least two levels of registration are mandatory; a) the general registration as co-operatives, which is done at the ministry; b) specific registration as a credit association, which is done at the courts and unions of other such bodies.

These registration requirements, especially the second level of registration are better handled by professional consultants or experts including lawyers.

SURVEY OF THRIFT SOCIETIES IN SELECTED COUNTRIES

According to Taylor (1974), the first credit society was formed by Herman Schulze-Delitsch in 1851 to provide credit facilities for debt-ridden peasant farmers in Germany. Co-operative credit associations have been found in several countries to be well suited to providing loan facilities and stimulating savings as evidenced from the study of selected countries further discussed.

Ghana

In Ghana, credit and thrift societies are owned, managed and controlled by the people of the areas in which they are located. They are responsible for financing co-operatives as well as members within each catchment area. Thus, the main task of these credit co-operatives were to mobilize savings from the area and to on-lend such savings to deserving customers of the area, to enable them improve their productivity. These credit co-operatives ensure that credits are made to agriculture and other priority rural activities and also to the small rural borrower.

To enhance borrowers' effective utilization of loans, a proper monitoring is carried out and assistance in terms of procuring needed inputs is also offered (Agwu, 2006).

India

The most widespread application of co-operative thrift society has been in India, where the problem of peasant indebtedness and greedy money lenders has been a

particularly serious issue. In India, co-operative banks and loan societies actually made an in-road into the rural areas, mainly as a result of official initiative and encouragement. The structures of co-operative banks were biased in favour of their occupations, which are agricultural co-operatives, employee's co-operatives, business co-operatives and industrial co-operatives

The co-operative credit structure for short and medium term credit is a three tier federal one. With a State co-operative bank at the apex in each state, the central co-operatives at the district level, and the primary credit societies at the base. This has greatly improved the financing of agriculture and small scale enterprises and led to rising trend in output. India is currently a net exporter of food and almost self-sufficient in industrial goods.

Germany

Co-operative credit providers are believed to have started in 1851 in Germany. In Germany, the orientations of the big commercial banks towards large scale industries created a gap in financing of farmers, petty traders, etc., which was filled by setting up of credit co-operatives. Raiffeisans co-operative bank helped to provide credit for debt ridden peasant farmers while Delitsch co-operative bank was for the independent farmers. Both quite independently sought their solutions through the co-operative credit associations.

Raiffeisan banks were based on village membership so that members knew, and could vouch for each other. They had no share capital, their farmer members accepted unlimited liability and their share of profits were not distributed but put into the reserve. It was from the reserves and the deposits of local salary earners that the banks accumulated their capital, and loans were made for productive purposes only, such as seeds, cattle and ploughs.

At the beginning of German's Industrialization, these credit associations emerged with a structure which provided a strong closeness to their customers. Deposits were quite safe for all creditors and depositors. This German model has been followed by most peasant economies in Central and Eastern Europe, Asia, and some African countries.

France

The orientation of the French commercial banks towards large-scale industry and commerce, as in Germany, created a gap in the provision of finance to farmers and craftsmen. In Germany, there were two major categories of financing associations; a) The co-operative banks proper, or those financing institutions collectively known as the *banques populaires* (People's Bank); b) The *Credit Agricole* – the state – controlled farmer's bank – a mutual credit and co-operative organization.

These co-operative banks, the People's Banks, began about a century ago and since 1878, they have multiplied all over France. They are not joint-stock companies as such, but association of persons putting together their savings, experience, and energies to distribute credit at a reasonable price from their own funds. But their current shape began to be formed in 1917 when, by the law of 13 March, 1917 on "the organization of credits for small and middle sized businesses and industry", received a specific co-operative status from the French Parliament. At this time, also began their vital co-operation with the *societies de caution mutuelles*, groups of companies in the same sector brought together at departmental level to act as guarantors for loans.

The People's Banks came into existence out of the spontaneous initiative of artisans, small industrialists, and traders who had the idea to unite at the local level, to help each other, and to lend each other money which the big banks refused to them (Tombola, 2009).

Although they serve as sources of finance for smaller industrialists generally, their "mission" as far as the government is concerned is to help the artisans, and they have an important function in administering and disbursing government funds placed at the disposal of this sector.

Members of the co-operative thrift association pay 10% of their net profits into a special safeguard fund to come to the rescue of anyone in difficulties.

In order to reinforce their activities of extending funds to smaller industrialists, the association has a subsidiary called *Sopcomec*, which provide funds to members in need of capital. Intervention includes the taking of minority participations.

The accessibility of credits to the "small man" and the determinedly regional character of these associations are noteworthy. Being more than ever conscious of the fact that the small and middle-sized enterprises and handicrafts face financial and management constraints, they have devised a wide range of services to meet their needs, for example they play the role of counselors and financial advisors. In addition, they also enter into partnership with enterprises.

RESEARCH METHODOLOGY

The study entails a survey of views and experiences in Nigeria and elsewhere on the utility of co-operative finance as sources of employment. The study relies more on secondary data. However, primary data was sourced to boost or confirm results as applicable to the Nigerian environment (Table 2). Using the chi square, the views of 40 respondents about the efficacy of the co-operatives as a source of finance for project implementation and employment generation in Nigeria was undertaken. The formula as expressed in Table 2 is:

$$X^2 = (F_o - F_e)^2 / F_e$$

Where x^2 = Chi-Square; F_o = observed frequency; F_e = Expected frequency

Hence, the paper has relied on both qualitative and quantitative

Table 2. The impact of co-operative credits on employment generation.

Response	Frequency				
	F _o	F _e	F _o -F _e	(F _o -F _e) ²	(F _o -F _e) ² /F _e
To a large extent	12	10	2	4	0.4
To an extent	16	10	6	36	3.6
To a little extent	7	10	-3	9	0.9
Not at all	5	10	-5	25	2.5
Total	40	40			7.4

Source: Field survey.

methods in order to overcome the limitation of both methods. Table 2 represents the responses of participants on the impact of co-operative credits on employment generation.

Conclusion

Credit co-operatives are a time honored and old organizational framework for effectively mobilizing the economic fortunes of people, especially people with low earning all over the world. As a socio-economic organization, co-operatives have also enhanced the optimum utilization of resources. This is because problems and weaknesses of individuals are solved through the group effort of the co-operatives since resources are pulled together and the economics of such group effort are redistributed. It is a major source of capital formation for small and medium size firms which is available for the benefit of individual members. It can also generate externalities through its employment creating impact.

In point, co-operatives are socially and individually profitable. But often, a co-operative is as good as its co-coordinators, or managers and this is the opening which young and agile graduates can take advantage of and reap substantial benefits. As the unemployment in Nigeria worsens, the thrift and loans co-operative can become a source of employment. The co-operatives can also be used as a medium to mobilize funds for job creation, through multiple project execution in the economy. With good management, this is not only possible but imperative for Nigeria now.

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Full Length Research Paper

Validating Google analytics tips for micro-firms

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In today's hyper-competitive and increasingly cost-conscious business environment, making a website findable is critical to its success. Effective website traffic monitoring and benchmarking may lead to better web site strategies, and more competitive micro-firms. In this context, the aim of this article is to validate Plaza's Google Analytics e-Metrics for micro-firms. The focus of this article is experimental and features the analysis of a case study.

Key words: Website, online advertising, bounce rate.

INTRODUCTION

Performance measurement of websites is becoming a critical issue for effective online marketing, at big and small firms alike. Website data are easy to collect, but analysis and interpretation are time and money-consuming. Google Analytics is a free service offered by Google that returns elaborated statistics about a website's traffic. Google Analytics can track visitors from search engines, including all referrers, display advertising, pay-per-click networks, email marketing and digital collateral such as links within PDF documents (Wikipedia, 2010). Using cross-sectional data, Plaza (2010) presents an experiment done with the information that Google Analytics offers about the number of visits on a website and their precedence: organic results in search engines, links from referral web pages or direct access. The importance of Plaza's articles is not the particular case study, but the methodology employed to arrive at those results.

The author's case study must be presented only as a way to explain the methodology, because it is a particular case and it should be validated for different websites. More experiments are needed with different data sets, so that the method has more general value. The aim of this article is precisely to test the methodology developed by Plaza (2010) through a different case study. The article is

structured as follows. Firstly, a literature review on Google Analytics is supplied. Secondly, the author validates the e-Metrics initiated by Plaza (2010), in order to evaluate the usefulness of each traffic source (which includes direct visits, referral entries and search engine arrivals). This is then followed by the conclusions.

LITERATURE REVIEW

Several scientific articles have analysed the use of Google Analytics and evaluated its usefulness as a web analytics tool. Fang (2007), Bhatnagar (2009) used Google Analytics to evaluate and develop a library website, utilizing the ordinary reports from Google Analytics; although, without developing specific metrics. Hasan et al. (2009) suggests specific web metrics that are useful for quickly indentifying potential usability problems of e-commerce websites. Betty (2009) explores the use of Google Analytics to track usage statistics for interactive Shockwave Flash (.swf) files, the common file output for screen cast and Flash projects. Plaza (2009, 2011) explores some statistical matters with regards to the use of Google Analytics data, in combination with time series methodology. Finally, Plaza (2010) sets up Google Analytics e-Metrics for micro-firms using basic cross-sectional data. The aim of this article is to re-test this methodology for a specific Adventure Sports Tourism website: <http://www.troka.com>.

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HYPOTHESES TESTING

Plaza (2010) performed cross-sectional analysis with Google analytics showing that:

Rule #1: Return visits navigate deeper into the website and stay longer (that is, there is more time spent at the site and/or a greater number of pages viewed per visit).

Rule #2: The less the bounce rate (that is, the number of error visits), the longer the visit length (with regard to the time spent at the site and/or the number of pages viewed per visit).

Rule #3: The greater the return visit rate, the less the bounce rate (that is, the number of error visits).

These rules are now tested for an active sports tourism website: <http://www.troka.com>. Business professionals take action based on measurable results using analytics to improve the effectiveness of the web content management and leverage information in their website. The aim of this work is to validate Plaza's Key Performance Indicators (KPI) using Google Analytics. Our tested website is <http://www.troka.com>, an active sports tourism firm. Troka Abentura, S.L. was born like 'Active Tourism and Adventure Sports' company in 1999. The firm's website pursues the dissemination of information in the field of the company's products. In June 2007 the Webmaster started to analyse web traffic using Google Analytics (<https://www.google.com/analytics/>). From 15 June 2007 to 14 June 2010, Google Analytics registers 57,095 entries. Of those visits, 48,675 came directly to this site, referring sites sent 2,210 visits, and search engines sent a total of 6,210 visits, mainly through Google. Direct visits are, by far, the main source of entries for <http://www.troka.com>: almost 85% of the total incoming visits (Figure 1). But how deep into the website do direct visits navigate, in comparison with other traffic sources? Are direct visits more effective than search engine entries? Which is the most effective traffic source? How deep do Google entries navigate? Which are the most effective keywords?

For the purpose of providing a preliminary answer to these questions, the already stated 3 rules (and key metrics) are applied in order to measure simple cross-sectional data as follows:

1. The first step is to collect all the data (Table 1): The number of visits for each traffic source, session length (that is, the time spent on the site and/or the number of pages viewed per visit), the bounce rate and the return visits rate. These indicators correspond to average values for the period 15 June 2007 to 14 June 2010.

2. Next, the traffic sources have to be sorted according to traffic volume. A ranking from the highest to the lowest traffic volume source is established. Next, the top ten are selected.

3. Then, the top traffic sources with the highest return rate should be selected. The key questions are the following: Which are the traffic sources that generate traffic and also produce a high return rate? Which are the traffic sources that produce entries and achieve a return rate above average? The answers can be seen in Figures 2, 3 and 4. In general, return visits travel deeper into the website and bounce less. It is for this reason that 'maximizing return rate' criteria has been chosen. However, the website owner can either choose to minimize 'bounce rate' or to maximize session length - with regards to the time spent at the site and/or the number of pages viewed per visit. For this particular website, it can be seen that the most effective traffic sources are the keyword 'troka', direct traffic and Google.

4. Next, a scatter plot is created for the return rate against the number of pages viewed per visit for all the main traffic sources (Figure 2). From Figure 2, it can be seen that there is a positive relationship between return rates and the number of pages viewed per visit for the traffic sources (Rule No. 1).

5. The next stage is to scatter plot bounce rates against the number of pages viewed per visit (Rule No. 2 in Figure 3). The aim here is to identify the qualified low bounce traffic sources. The referrals <http://www.mybilbao.bizkaia.com> and <http://www.turismo.gorliz.net> and the keyword 'aventura' in search engines qualify with the lowest bounce rate (Figure 3).

6. The next stage is to scatter plot bounce rate against return rate for all the traffic sources (Figure 4). From Figure 4, it can be seen here that, there is a negative relationship between bounce rate and return rate (Rule No. 3). The keyword 'troka' qualifies both a high return rate and the low bounce rate. Direct traffic and the referral www.troka.com perform also relatively well, in terms of higher return rates and qualified low bounce rate traffic.

The webmaster can quantify the relationships that underlie these graphs through very simple regression analysis, as can be seen in Tables 2, 3 and 4. Several regressions are undertaken. The Breusch-Godfrey Serial Correlation LM Test is used to check autocorrelation. The White Test is used to test heteroskedasticity, and the Jarque-Bera statistic to test normality of residuals. The presence of outliers is corrected through the use of dummies. The regressions are well-adjusted. The fitted estimations are in Tables 2, 3 and 4.

According to the reading of the results in Table 2, a 1% increase in the return rate leads to a 0.11 increase in the number of pages viewed per visit. Furthermore, according to the Intercept Dummy Variables, the referrals www.adclick.es and <http://es-es.facebook.com> under perform. In other words, it is clear for this particular website that return behaviour increases visit duration.

A 1% increase in the Bounce rate leads to a 0.07

Table 1. Traffic sources for www.troka.com (average values from 15 June 2007 to 14 June 2010).

	Variable	Visits	Pages per visit	Average time on site	Bounce rate (%)	Return visits rate (%)
Traffic sources	Total	57.095	6.0	0:02:19	46.7	35.6
	Direct traffic	48.675	6.2	0:02:09	47.5	36.7
	Referring sites	2.210	6.1	0:02:51	38.6	25.5
	Search engines	6.210	4.8	0:03:25	42.9	30.4
Top 7 referring sites by traffic	gorlizaterpetxea.com	1.243	7.7	0:03:02	32.5	23.1
	ruraliberica.com	100	7.0	0:06:16	27.0	26.0
	zankyou.com	53	1.6	0:00:57	83.0	3.8
	turismo.gorliz.net	36	6.8	0:05:48	25.0	30.6
	mybilbaobizkaia.com	35	3.3	0:02:08	22.9	11.4
	adclick.es	34	5.3	0:05:47	44.1	64.7
	facebook.com	22	2.7	0:01:04	54.6	59.1
Search engines	Google	5.555	5.0	0:03:37	40.5	32.5
	Bing	246	2.5	0:01:23	70.3	9.4
	Search	241	2.7	0:01:39	61.0	16.2
	Yahoo	66	3.4	0:02:16	62.1	7.6
Top 15 keywords by traffic	All keywords	6.210	48	0:03:25	42.9	30.4
	troka	3.339	6.3	0:04:41	27.8	45.8
	abentura	1.246	4.7	0:03:15	44.7	26.4
	aventura	650	5.9	0:03:28	25.5	24.0
	Gorliz	575	5.7	0:03:49	37.2	27.7
	albergue	342	4.9	0:03:13	34.2	17.5
	troka.com	269	9.7	0:08:02	28.6	50.6
	bizkaia	241	5.1	0:05:25	35.7	22.8
	surf	209	3.6	0:02:11	32.5	27.8
	vasco	206	3.4	0:02:07	43.2	16.5
	vizcaya	155	4.0	0:02:44	43.2	8.4
	deporte	120	3.2	0:01:33	51.7	10.0
	curso	111	3.1	0:01:53	42.3	26.1
	euskadi	102	3.5	0:02:09	44.1	6.9
	actividad	88	3.8	0:02:05	44.3	7.9
tirolina	86	4.9	0:04:43	66.3	24.4	

Source: Google Analytics for www.troka.com

decrease in the number of pages viewed per visit (Table 3). The negative relationship between Visit Duration and Bounce Rate (error visits) makes sense. Finally, a 1% increase in the Bounce Rate leads to a 0.40% decrease in the return rate (Table 4). Furthermore, according to the Intercept Dummy Variables, the referrals www.adclick.es and http://es-es.facebook.com perform above average, showing a higher return rate. Summarising, the lesser the bounce rate, the better the website's performance. On average, traffic sources with a high bounce rate shows that, the webmaster failed to meet his/her expectations.

Conclusions

Google Analytics tips for micro-firms have been re-tested with a different data set. This new test confirms that, traffic sources that work most effectively are those: 1) which drive a higher traffic volume; 2) which have the highest return rate; 3) which have the largest visit length and 4) which have the lowest bounce rate.

The results obtained here with cross-sectional data from the website http://www.troka.com are consistent with those results obtained by Plaza (2010) with data from the

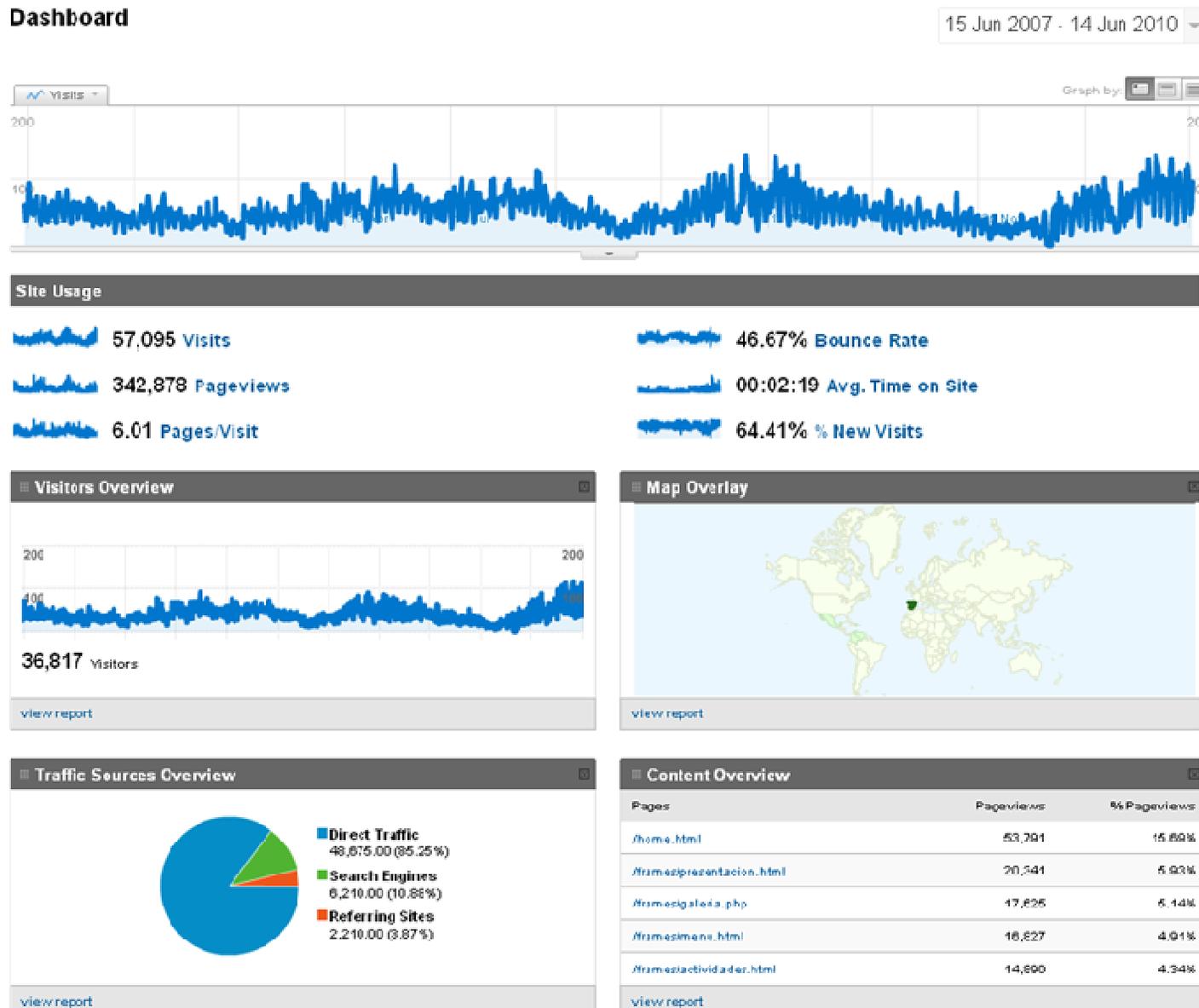


Figure 1. Google Analytics overview for www.troka.com (daily data, 15 June 2007 to 14 June 2010). Source: Google Analytics for www.troka.com.

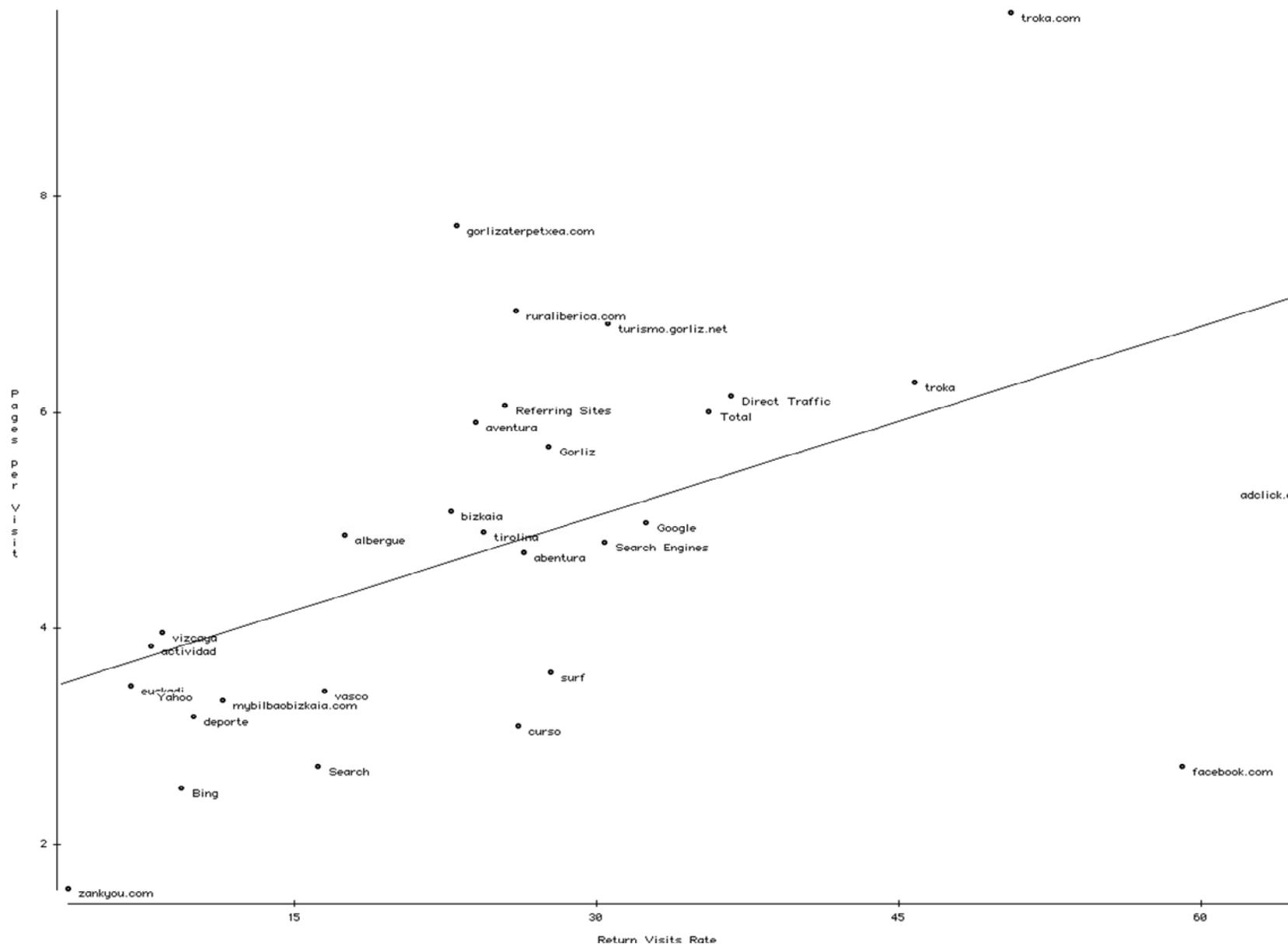


Figure 2. Traffic sources for www.troka.com. Rule #1, return visits navigate deeper into the website and stay longer (average values from 15 June 2007 to 14 June 2010).

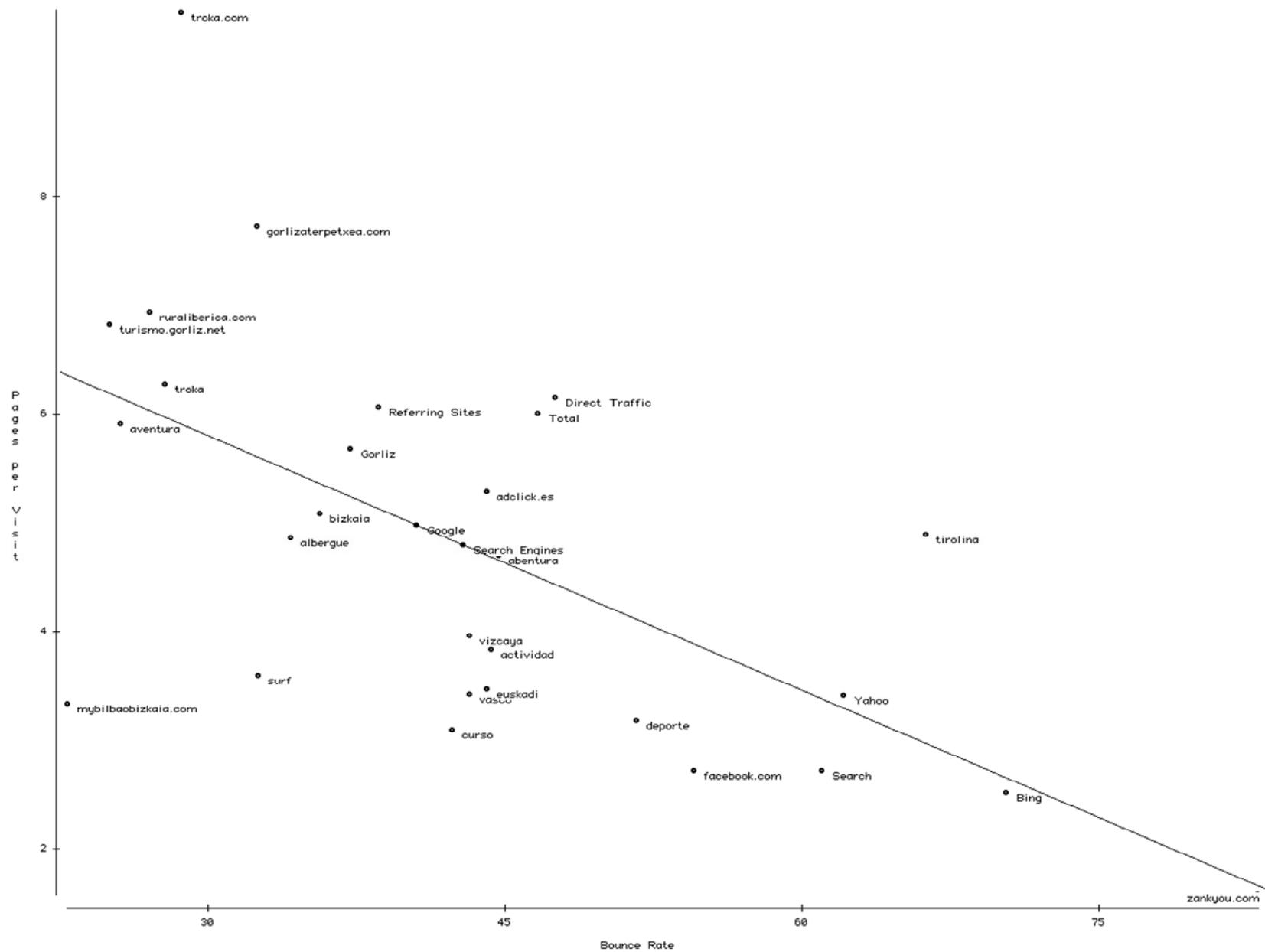


Figure 3. Traffic sources for www.troka.com. Rule #2, the smaller the bounce rate, the greater the visit duration (average values from 15 June 2007 to 14 June 2010).

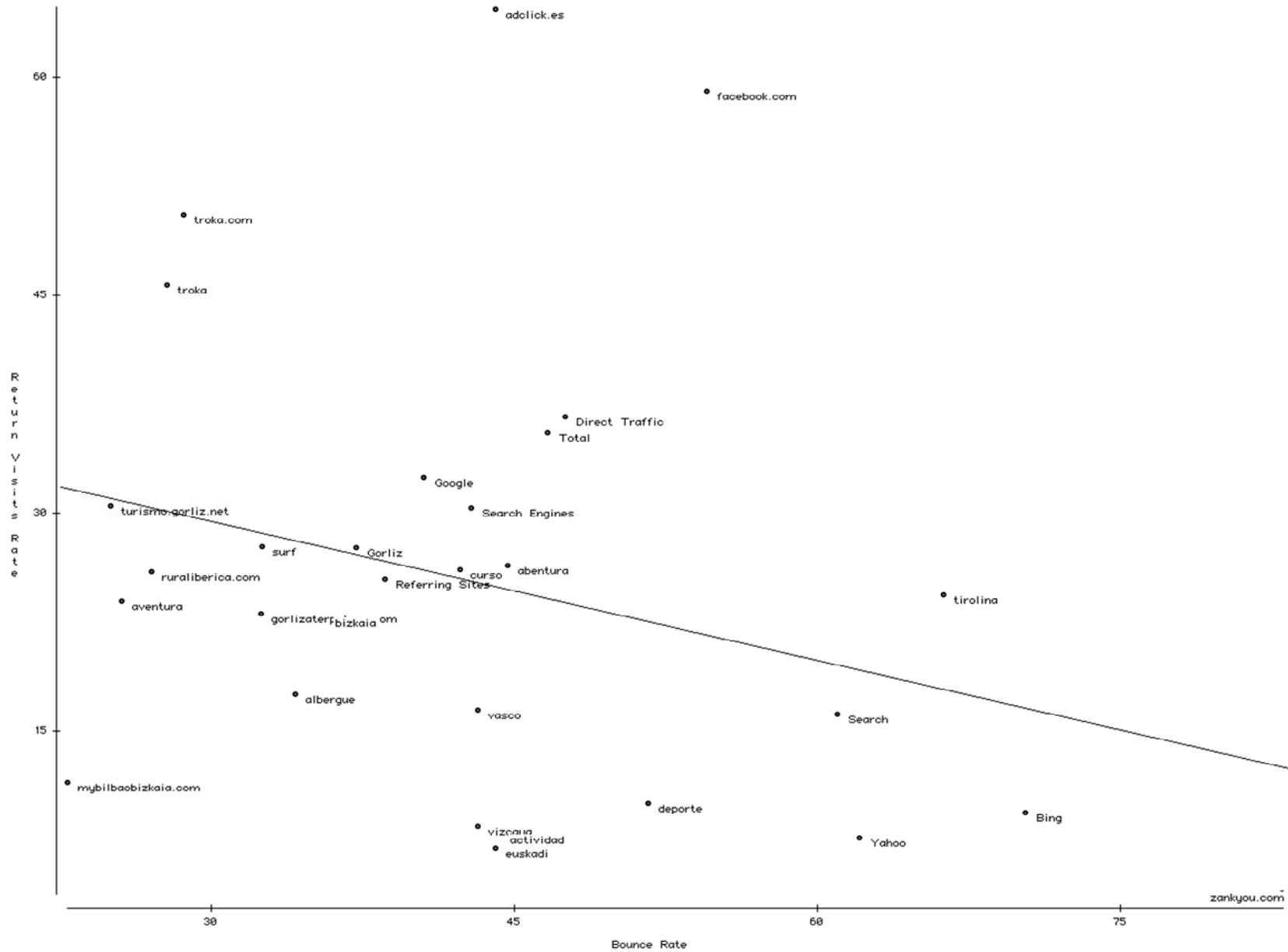


Figure 4. Traffic sources for www.troka.com. Rule #3, the greater the return visit rate, the smaller the bounce rate, (average values from 15 June 2007 to 14 June 2010).

Table 2. Regression for pages per visit (average values from 15 June 2007 to 14 June 2010).

Variable	Coefficient	Standard error	t-Statistic	Probability
Constant	2.18	0.47	4.60	0.000
Return rate	0,11	0.01	6.26	0.000
Dummy adclick.es (in-link)	-4.45	1.41	-3.15	0.000
Dummy facebook (in-link)	-6.36	1.35	-4.68	0.000
N = 30				
R ² = 0.62	F-statistic = 14.21		Prob (F-statistic) = 0.00	
Breusch-Godfrey Serial Correlation LM Test:	F-statistic 0.14		Probability 0.70	
White Heteroskedasticity Test:	F-statistic 0.62		Probability 0.64	
Jaqure-Bera 3.19			Probability 0.63	

Table 3. Regression for pages per visit (average values from 15 June 2007 to 14 June 2010).

Variable	Coefficient	Standard error	t-Statistic	Probability
Constant	8.16	0.82	9.89	0.000
Bounce rate	-0.07	0.01	-4.33	0.000
N = 30				
R ² = 0.40	F-statistic = 18		Prob(F-statistic) = 0.00	
Breusch-Godfrey Serial Correlation LM Test:	F-statistic 1.06		Probability 0.35	
White Heteroskedasticity Test	F-statistic 2.03		Probability 0.14	
Jaqure-Bera 1.71			Probability 0.42	

Table 4. Regression for return rate (average values from 15 June 2007 to 14 June 2010).

Variable	Coefficient	Standard error	t-Statistic	Probability
Constant	39.81	6.23	6.38	0.000
Bounce rate	-0.40	0.13	-2.92	0.007
Dummy adclick.es (in-link)	42.65	10.7	3.98	0.000
Dummy facebook (in-link)	41.22	10.8	3.80	0.000
N = 30				
R ² = 0.57	F-statistic = 11.59		Prob(F-statistic) = 0.00	
Breusch-Godfrey Serial Correlation LM Test	F-statistic 2.15		Probability 0.21	
White Heteroskedasticity Test:	F-statistic 0.71		Probability 0.59	
Jaqure-Bera 0.46			Probability 0.79	

web 'Scholars on Bilbao' <http://www.scholars-on-bilbao.info>.

Future work calls for running the same experiment in other websites with different web architecture and dissimilar aims.

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Full Length Research Paper

An empirical study of factors that affect the transition time between CMMI (Capability Maturity Model Integration) levels in Saudi Arabia

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In recent years, software process improvement (SPI) has been the concern of software industries. Numerous studies have been done in the development of SPI standards and models, or to identify factors that affect SPI success. However, these studies did not provide answers to questions about the factors that affect the transition time between CMMI (capability maturity model integration) levels, and why there are obvious differences in the organizations' transition time between CMMI levels. The objective of this research is to identify the factors that can affect the transition time between CMMI levels. We conducted 10 interviews in 7 different Saudi's software companies to extract the factors and compare these factors with what are in the literature to avoid redundancy. Based on this, we designed a questionnaire. We sent out 117 requests to participants, and 46 responded from 12 companies. We asked the participants to rank each factor on a five-point scale (high, medium, low, zero and not sure) to determine the effect of each factor, after which we identified 21 factors that are considered effective factors on the transition time between CMMI levels. Also, we identified two new factors (Turnover of staff and Imposed partner) which were not identified in the literature.

Key words: Software process improvement, CMMI (capability maturity model integration), factors, transition time, empirical study.

INTRODUCTION

In recent years, issues associated with software quality are widely diffused to affect development cost and time (Sommerville, 1996; Okay and Semiz, 2010). The software industry has been more concerned about the software process improvement (SPI). Software quality has become more critical as software pervades our day-to-day lives (Paulk et al., 1994). The decrease of transition time between CMMI levels can lead organisations to business benefits. A group of fellows of the Royal Academy of Engineering and British Computer Society demonstrated that despite spending 22 billion pounds on Information Technology projects in the UK during 2003/2004, some projects could not be delivered on time (The Royal Academy of Engineering, 2004). Therefore, in general, time is still the main issue that affects an

organization's business benefits. SPI has some models; capability maturity model integration (CMMI) is one of the reference models that have a strong connection with organizations' quality. CMMI can be described as a collection of the best practices gathered from the experiences with software- capability maturity model (SW-CMM), and other standards and models (SEI, 2007). However, there is obvious difference in the organizations' transition time in order to move from one level to another. Despite the fact that Software Engineering Institute (SEI) has specified an average transition time between CMMI levels, there is still an obvious deviation in various software organizations in terms of their transition time between CMMI levels. The effort put into these models and standards can assist in producing high quality software, reducing cost and time, and increasing productivity (Butler, 1995; Pitterman, 2000; Yamamura, 1999). However, little attention has been paid to the effective implementation of these models and standards (Goldenson and Herbsleb, 1995). Therefore, the transition time between

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CMMI levels needs more investigation. Thus, the main objective of this study is to investigate the factors that affect the transition time between CMMI levels in Saudi Arabia, and in light of that, apply the factors in an empirical study over Saudi's companies. This paper presents the results of an empirical study aimed at identifying and investigating the factors which have an effect (positively or negatively) on transition time between CMMI levels, based on the perceptions and experiences of practitioners in a developing country like Saudi Arabia. As such, we limited our research to the companies that have already achieved CMMI level 3 or companies which have CMMI level 2 and have already started achieving CMMI level 3. Our investigation has several interesting findings which enabled us to identify and explain the relative factors which affect the transition time between CMMI levels in Saudi Arabia. We have analyzed the experiences, opinions and views of practitioners in the literature (that is, case studies, reports and journal papers...etc). Also, we have conducted a study on factors that have an impact on the transition time between CMMI, and have critically analyzed and discussed each factor which affects the duration/transition time between CMMI levels. Our results may provide feasible and timely advice to SPI decision makers in designing appropriate strategies to accelerate the transition time between CMMI levels.

LITERATURE REVIEW

In the last decade, numerous studies were done for the transition time between CMMI levels. Jackelen (2007) started a CMMI program with the goal of achieving the CMMI Level 2 and satisfaction process areas within five months. After the analysis of the current status of the company, the top management decided to extend the plan's schedule of the program for one month. This paper discussed how it was possible to achieve CMMI Level 2 in six months. The factors identified in this study were: Management commitment, experienced staff, consultant, training, awareness and quality environment. Guererro and Eterovic (2004) explored a case study that has achieved the movement of CMM from CMM Level 1 to CMM Level 2 in 10 months and which ordinarily would be achieved in 19 months on the average time according to the data of SEI (2004). They analyzed ten factors that affected the adoption of CMM, and these factors were: Training, developer's involvement, maintaining momentum, group focus, frequency of process assessments, champions, and visibility into the SPI process. Balla et al. (2001), Iversen and Ngwenyama (2006), and Akmenek and Tarhan (2003) have described an achievement of CMM-Level 3 in 7 months, which ordinarily would be achieved in 19 months according to SEI (2004). The identified factors were: Management commitment, awareness, staff involvement, training, experienced staff, consultations and quality environment. Olson and Sachlis

(2002) discussed the movement of CMM from CMM-Level 1 to CMM-Level 3 in 14 months which would ordinarily be completed in 38 months based on the time average according to SEI data (2004). The identified factors were management commitment, staff involvement, training, consultant, implementation plan and process documentation. Zeid (2004) has explained how the organization, ITSoft, moved from CMM Level 2 to CMM Level 3 in a short time just in two months and from CMM Level 1 to CMM Level 2 in 9 months. The identified factors were: training, experienced staff, quality environment, implementation plan, process documentation, and metrics and measurement. It is important to conduct an empirical research in order to provide more certainty in exploring these factors that affect the transition time between CMMI levels, since an empirical research enables rigorous experimentation by encouraging multiple analysis from multiple perspectives using different approaches, and helps to compare what we believe to what we observe (Harrison et al., 1999; Perry et al., 2000). Therefore, the empirical research helps researchers move toward well-founded decisions (Perry et al., 2000).

An empirical investigation of SPI implementation factors will provide SPI practitioners with valuable insights through planning of SPI strategies (Niazi et al., 2006). A good understanding of the transition time factors of CMMI should help organisations accelerate movement between CMMI levels. The decrease of transition time between CMMI levels can lead organisations to business benefits.

METHODOLOGY

Research approach

In this study, we identified people who are already involved in software development industry, to extract factors which are having a high impact on transition time between CMMI levels. For this purpose, the following were set up:

1. Conducting a face to face meeting, to extract the factors that affect the transition time between CMMI levels without any suggestions from the researchers.
2. Factors filtration: To identify and avoid redundancy of factors which have different names with the same meaning between practitioners and literature review.
3. Survey design: Designing a questionnaire in favor of this study in order to collect the data from respondents.
4. Distribution stage: To distribute and apply the questionnaire in Saudi Arabia.
5. Data analysis was done according to the data collected from respondents.
6. Results: To find out the findings and determine the effective factors from the data set.

Study scope

In this research, the study scope is on the companies which have already adopted CMMI and achieved CMMI level 3 or companies which have CMMI level 2 and have already started the process of achieving CMMI level 3.

Population and sample profile

Software organizations and companies are considered as the target population for this study. This population includes companies that develop either software or combined software and hardware products for a wide variety of markets. According to our study and scope, we sent out 117 requests to participants, of which only 46 out of the 12 companies distributed over Saudi Arabia responded back. This implied that the response rate was 39.32%. However, we have high confidence in the accuracy and validity of the data. Forty-six practitioners voluntarily participated in this study. It was important to ensure that there is no particular practitioner that was over-represented (Coolican, 1999). This research addressed the issue of overrepresentation by using a sample of companies of varying complexity, size, business nature, application type, etc. A similar approach has been used by other researchers (Baddoo, 2001; Baddoo and Hall, 2002, 2003; Niazi et al., 2006).

Data instrumentation

In this study, we have used a questionnaire as the main instrument to gather survey data from companies. A survey research method can use one or more data elicitation techniques such as interviews and self administered questionnaires (Lethbridge, 2005). It is deemed suitable for eliciting quantitative and qualitative data from respondents (Lethbridge, 2005). A questionnaire was pre-tested by 7 SPI personnel in domestic software companies and 4 graduate students at the authors' university. Guelford (1965) suggested that reliabilities of Cronbach's alpha are high if Cronbach's alpha is over 0.70. Therefore, in our analysis, the pre-test of the expert questionnaire appeared with a high average Cronbach alpha of 0.799; this indicated that the questionnaire was acceptable and internally consistent. We used e-mail, telephone calling and face to face meeting sessions. Since it was possible to illustrate the objectives of the research with the different terms used in the questionnaire and clarify the purpose of different questions included in the questionnaire, data validation was ensured before each survey session was concluded. The survey session duration was about 45 min.

Effective factor

In this study, we defined effective factor to measure the extent to which the factor has an effect on the transition time between CMMI levels, and whether it adds value to the transition time of CMMI based on the perceptions and experiences of practitioners who have been involved in the area of SPI at their respective organisations. In order to describe the notion of effective factor on transition time of CMMI, it is essential to decide on the importance of an effective factor. For this purpose, we have used the following definition:

"If the majority of respondents ($\geq 50\%$) consider that a factor has a high effect on the transition time of CMMI, then we treat that factor as an effective factor."

A similar approach has been done in the literature (Niazi and Babar, 2009; Niazi et al., 2005; Rainer and Hall, 2002). Rainer and Hall (2002) identified important factors in SPI with the criterion that if 50% or more participants consider that a factor has a major role in SPI efforts, then that factor should be considered as having a major impact on SPI.

Data collection

According to the research objectives and available resources,

although with a dependence on what was suggested by Alam (2011), we used a survey research method to gather data about Saudis practitioners' perspective of the factors that affect the transition time between CMMI levels. A survey of data collection was considered suitable for gathering quantitative and qualitative data from a number of respondents (Kitchenham and Pfleeger, 2002). A survey of data collection can use one or more data elicitation techniques, such as interviews and questionnaires (Lethbridge, 2005). We have used a closed format questionnaire as a data collection approach in conjunction with face-to-face meetings during some stages of data collection. In order to make sure of clarifying the research objectives, data validation was ensured for the terms used in the questionnaire, before completing each survey session. We conducted 10 interviews in 7 different software companies in Saudi Arabia, with flexible schedules so that interviewees could make an appointment at any time that will be suitable for them (Fowler, 2002). We sent 117 questionnaires by email to those included in our scope. The questionnaire was based on the factors that affect the transition time between CMMI levels. We designed a questionnaire to gather the effective factors where each respondent was asked to rank each factor that has an effect on transition time between CMMI levels. In order to identify the effective factors, the respondents were asked to note each factor's relative value (that is, high, medium, low, zero, or not sure).

RESULTS

Factors that affect the transition time between CMMI levels in Saudi Arabia

Table 1 shows the list of impacting factors that affect the transition time between CMMI levels. According to the scope of this study, Table 2 identifies the high frequency and percentage of each factor that affect the transition time between CMMI levels in Saudi Arabia. Table 3 shows the effective factors in the transition time between CMMI as training (89%), management commitment (85%) and gap analysis (85%). This indicates that in the Saudi practitioners' opinion, training can play a vital role in the transition time between CMMI levels. Therefore, this result almost agrees with that of Olson and Sachlis (2002), Balla et al. (2001), Iversen and Ngwenyama (2003) and Akmenek and Tarhan (2003). Other frequently effective factors in Saudi Arabia are: turnover of staff, review, allocation of resources, resistance to change, separation of process and product concerns, CMMI experienced staff, Defined SPI implementation methodology, visibility into the SPI process planning, imposed partner, change of management, unscheduled events, investments of a company, management and staff involvement, awareness, process documentation, frequency of process assessment, metrics and measurement, and consultation. Table 4 shows the non effective factors on the transition time between CMMI levels which are having less impact. From our empirical study in Saudi Arabia, we have noted that the factors - turnover of staff and imposed partner - are new effective factors; whereas, to the best of our knowledge, in literature and previous studies, we did not find that these new factors have been identified or taken up as effective factors on the transition

Table1. Factors that affect the transition time between CMMI levels.

Factor	Saudi Arabia (n=46)				
	H	M	L	Z	N/S
Self-motivation power	22	8	2	4	10
Turnover of staff	38	8	0	0	0
Market conditions changes	4	3	32	6	1
Cost of appraising	15	18	6	3	4
Change of management	32	11	1	1	1
Investments of a company	29	14	1	1	1
Many roles to one person	3	1	1	39	2
Unscheduled events	31	11	1	3	0
Financial motives	8	17	11	7	3
Public holiday events	0	1	25	20	0
Imposed partner	33	10	1	0	2
Job respecting	3	6	21	16	0
Income level	13	12	21	0	0
Management commitment	39	7	0	0	0
Frequency of process assessment	26	19	0	0	1
Separation of process and product concerns	37	9	0	0	0
Management and staff involvement	29	10	0	0	7
Training	41	4	0	0	1
Review	38	8	0	0	0
Defined SPI implementation methodology	34	10	0	0	2
Awareness	29	13	3	1	0
CMMI Experienced staff	37	3	1	0	5
Communication	9	2	29	0	6
Group focus	20	18	0	0	8
Process documentation	29	17	0	0	0
Consultation	23	19	1	0	3
Metrics and Measurement	26	20	0	0	0
Allocation of resources	38	8	0	0	0
Rewards	8	17	11	7	3
Gap analysis	39	6	0	0	1
Resistance to change	38	8	0	0	0
Visibility into the SPI process planning	34	10	0	0	2

H= High; M= Medium; L = Low; Z = Zero; N/S = Not sure.

time between CMMI levels.

By using effective factor criterion, we identified 21 factors that are generally considered as effective factors for the transition time between CMMI levels. Figure 1 shows visual description for the identified effective factors in Saudi Arabia. However, X axis represents the factors, while Y axis represents the numbers from 0 to 100. The red column represents the percentage, while the blue column represents the high frequency. Figure 2 shows visual description for 10 factors which are non effective in Saudi Arabia. Thus, each pie represents the high frequency of each factor and its percentage.

DISCUSSION

In this paper, we presented an empirical study on factors

that affect the transition time between CMMI levels in Saudi Arabia. A good understanding of the factors that can delay the transition time between CMMI levels is expected to help organisations identify what strategies they need to use in order to address these factors and accelerate the transition time from one level of CMMI to another. We believe that these factors can be very useful for Saudis' CMMI based SPI practitioners as these can help them in planning for CMMI level 3 in their organisations.

Our results indicate that software development organisations need to improve their training planning, and the staffs also need training courses (for example introduction to CMMI, Intermediate CMMI and SCAMPI). However, this kind of similar understanding was noticed by Alam (2009) and Alam et al. (2010). Management

Table 2. Identifying the high frequency and percentage of each factor.

Factor	Saudi Arabia	
	High	Percentage
Training	41	89
Management commitment	39	85
Gap analysis	39	85
Turnover of staff	38	83
Review	38	83
Allocation of resources	38	83
Resistance to change	38	83
Separation of process and product concerns	37	80
CMMI experienced staff	37	80
Defined SPI implementation methodology	34	74
Visibility into the SPI process planning	34	74
Imposed Partner	33	72
Management of change	32	70
Unscheduled events	31	67
Investments of a company	29	63
Management and staff involvement	29	63
Awareness	29	63
Process documentation	29	63
Frequency of process assessment	26	57
Metrics and measurement	26	57
Consultation	23	50
Self-Motivation power	22	48
Group focus	20	43
Cost of appraising	15	33
Income Level	13	28
Communication	9	20
Financial motives	8	17
Rewards	8	17
Market conditions changes	4	9
Many roles to one person	3	7
Job respect	3	7

Commitment is one of the factors that are mostly important for any organization as identified by Alam et al. (2010) and Ponnu and Chuah (2010). Thus, management may delay the transition of CMM from a particular CMMI level to a higher one as a result of one or more of the following points:

1. If the management has identified projects for the CMMI and others for the important work.
2. If it has limited its role in contracting with a consultant and a follow-up of an evaluation without efforts to improve the operations.
3. If the management is working on the process now until we deploy the product or software to the client, then we complete the documents later.
4. If the management did not seriously consider the workflow reports and then makes decisions based on their own impressions rather than on facts.

5. If the management seeks only the certificate without obtaining the real value of the application.

When the turnover of staff is often low, the duty of the fundamental work team that built the company's quality system after the end of an appraisal, is to assign the task to a new team, perhaps one that is newly appointed, to complete the march. The new team needs more time in this case, which leads to consumption of more time in the transition. Chiboiwa et al. (2010) explained some external influences that increase the level of staff turnover which are a level of payment, dissatisfaction with the reward system in an organisation, and opportunities for alternative employment outside the country.

The imposed partner factor is identified as a factor that has a negative impact on the transition time of CMMI, since the partner type in huge projects would affect the employee's productivity and delay the documentation

Table 3. Effective factors in Saudi Arabia.

Factor	Saudi Arabia	
	High	Percentage
Training	41	89
Management commitment	39	85
Gap analysis	39	85
Turnover of staff	38	83
Review	38	83
Allocation of resources	38	83
Resistance to change	38	83
Separation of process and product concerns	37	80
CMMI Experienced staff	37	80
Defined SPI implementation methodology	34	74
Visibility into the SPI process planning	34	74
Imposed partner	33	72
Change of management	32	70
Unscheduled events	31	67
Investments of a company	29	63
Management and staff involvement	29	63
Awareness	29	63
Process documentation	29	63
Frequency of process assessment	26	57
Metrics and measurement	26	57
Consultation	23	50

Table 4. Non effective factors in Saudi Arabia.

Factor	Saudi Arabia	
	High	Percentage
Self-motivation power	22	48
Group focus	20	43
Cost of appraising	15	33
Income level	13	28
Communication	9	20
Financial motives	8	17
Rewards	8	17
Market conditions changes	4	9
Many roles to one person	3	7
Job respect	3	7

processing. Consequently, this will consume time and delay the transition time between CMMI levels (this partner is added to the organization because of his high social situation).

Other factors identified in this study are completely in agreement with the study of Balla et al. (2001), Iversen and Ngwenyama (2003) and Akmenek and Tarhan (2003).

Through this empirical study, we recommend that practitioners of CMMI-based SPI can design and develop

better strategies to decrease the transition time with the factors identified in this study.

RESEARCH LIMITATIONS

This research has some limitations which are attributed to:

1. Lack of the literature that investigated the transition time of CMMI-based SPI.

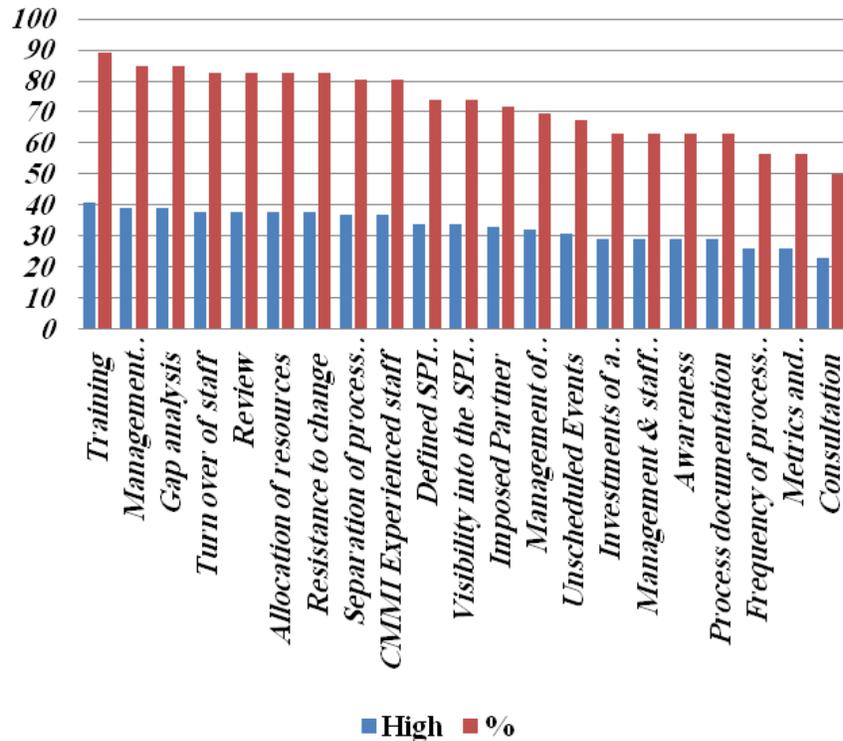


Figure 1. Effective factors in Saudi Arabia.

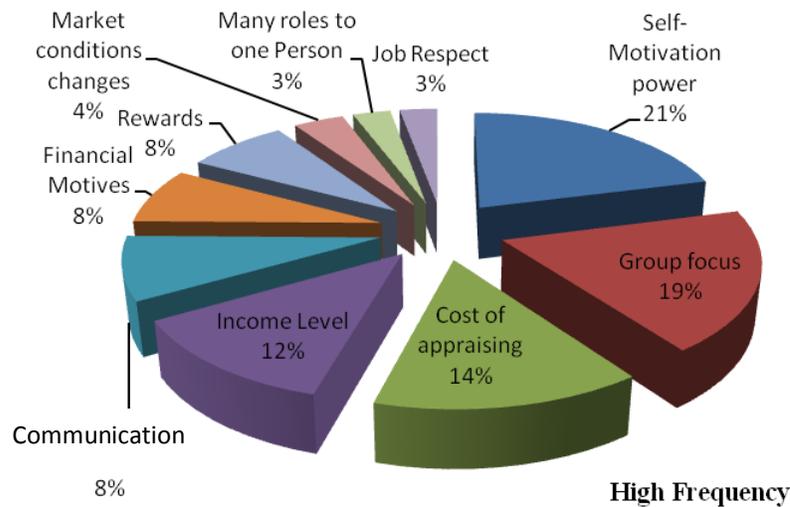


Figure 2. Non effective factors in Saudi Arabia.

2. Most of the Saudis' companies use other software process improvement models rather than CMMI.

Conclusion

This study focused on factors that affect the transition time between CMMI levels in Saudi Arabia. We analyzed

the experiences, opinions and views of practitioners in order to identify the factors that have an impact on the transition time between CMMI levels. Also, we identified factors that are effective on the transition time between CMMI levels. Focusing on these factors, cost-effective opportunities were offered so as to decrease the time spent through the duration between CMMI levels. In order to determine the effective factor, the following criterion

was used:

“If majority of the respondents ($\geq 50\%$) consider that a factor has a high effect on transition time of CMMI, then we treat that factor as an effective factor.”

Using this criterion, we identified 21 factors that are generally considered as effective factors for the transition time between CMMI levels. Also, we identified two new effective factors that affect the transition time between CMMI levels, which are: Turnover of staff and imposed partner. These two factors were not identified in the literature as effective factors affect the transition time between CMMI levels. We recommend that Saudis' organizations should focus on these effective factors to accelerate the transition time between CMMI levels. A good understanding of the transition time factors of CMMI should help organisations accelerate movement between CMMI levels. However, the decrease of transition time between CMMI levels can lead organisations to business benefits.

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Full Length Research Paper

Identifying emotional factors for quantitative evaluation of perceived product values

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The objective of this research was to identify emotional factors that affect the perceived value of products. After collecting 400 statements from consumer case studies, the authors summarized these statements into fifteen elements. Principal component analysis was then used to extract four emotional dimensions: Features (F), Association (A), Social-esteem (S), and Engagement (E). This system was called the FASE Index. To validate the applicability of these factors, this study used two design cases and the fuzzy analytic hierarchy process (FAHP) to quantitatively measure the perceived value of products. The results showed that the FASE index was sensitive enough for evaluating different products. In addition, there were no significant differences between the experiences of designers and potential consumers in these cases.

Key words: New product development, fuzzy analytic hierarchy process, emotional design, perceived value.

INTRODUCTION

In the process of designing and developing a new product, it is crucial for the management team to investigate consumer preferences and to meet the client's demands. When consumers consider purchasing a product or service, they usually base their choices on aspects such as quality, functionality, usability, cost performance index (CPI), which is the ratio of earned value to the actual cost of the work performed, and other traits. However, cost efficiency is not the sole factor under consideration in consumer behaviour studies. Many products today not only have utility value, which appeal to the rationality of consumers, such as quality, functionality, and usability, but many products also have an emotional appeal that emphasises hedonic values such as feelings, interactions and user experiences. Hence, when the price or functionality of a product is just the one of many factors to be considered, consumers often base their holistic assessment of the product and their decision making on what they know, feel or understand about the product. Strengthening the emotional and creative as well as the

innovative aspects of a design is thus seen as a key factor in enhancing a product's perceived value.

Although successful product design is regarded as an important driving force for companies to maintain their competitive edge, designers frequently encounter the problem of not knowing the preferences and responses of their consumers. However, if the targeted customers have no way of knowing the designers' ideas and creative processes, they often severely criticise the product because they cannot perceive the key values of the design. If a common language that could communicate a product's emotional dimensions could be developed, then the gap in perception between designers and consumers could be closed.

In order to address this issue, the objective of this research was to discover the factors that influence the perceived value of products from the emotional perspectives of consumers and designers.

LITERATURE REVIEW

Product design and perception differences

Design is a process that consists of a series of creative

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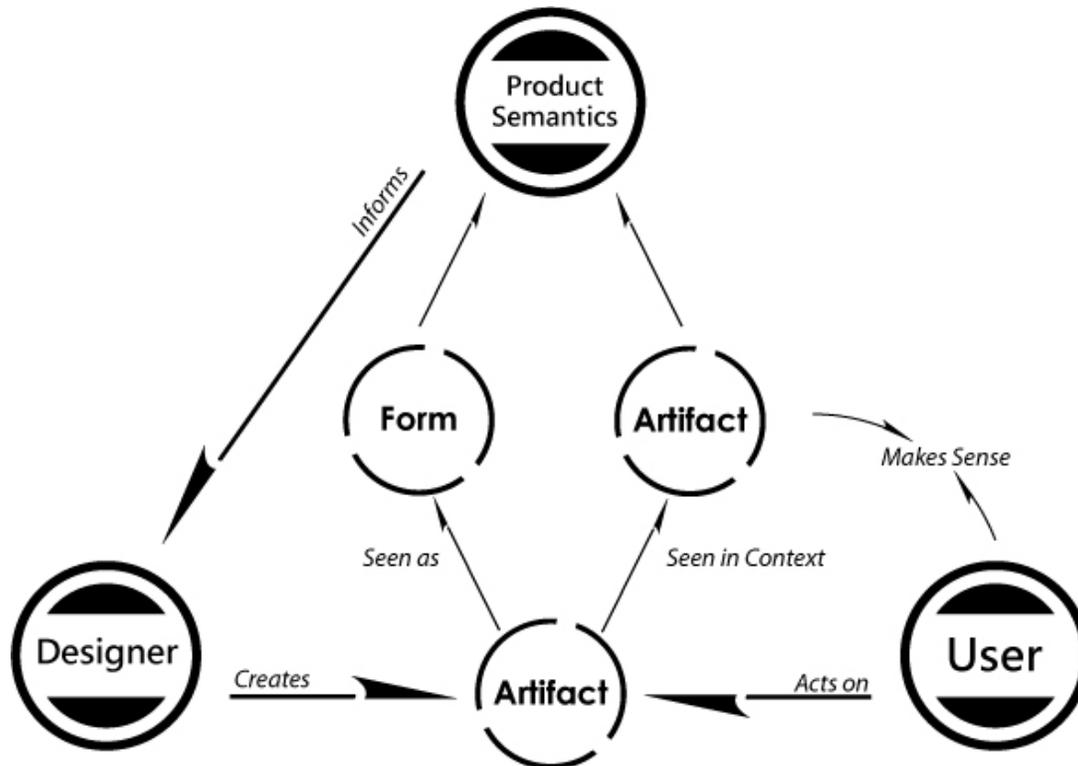


Figure 1. Krippendorff's product semantics (1984)

activities and often involves complex uncertainties. Designers use their imagination to create products that are ultimately selected and used by consumers. Although both product formation and consumer response are determined by many correlated factors and are difficult to predict, it is still possible to develop models for design guidance (Crilly et al., 2009). For instance, both Krippendorff (1984) and Norman (1988) indicated that the key connections for communicating a message are formed between the designer, the product, and the user (Figure 1). In practice, however, designers and users do not necessarily share the same interpretations of the product. Additionally, designers often misunderstand the actual demands of consumers, especially from an emotional perspective (Bahn et al., 2009). There are abundant examples of products that have creative, ingenious designs, but have poor sales performance due to the difference in perspective between designers and users (Krippendorff, 1984).

The reason why designers and users fail to communicate perfectly is mainly due to differences in background, as the designer's mode of thinking does not necessarily correspond to the user's thinking (Preece et al., 2006). Hence, bridging the gap between designers and users has been a challenging topic that research specialists have attempted to tackle. To address this issue, it was important to find an index for assessing the emotional dimensions of a product design and provide a form of

communication between designers and users that could help to reduce differences in perception. Furthermore, since the perception of products could possibly be affected by emotions, available theories relevant to emotional design should not be neglected.

Emotional design

Emotional design has become the focus of a large number of research topics, and terms such as 'emotional engineering', 'affective design', 'affective ergonomics', and 'design for human senses' (Engage, 2005) have begun to appear in various disciplines.

Jordan (1999) drew on Maslow's theory of the five levels of basic needs, which were presented in 1943, to formulate his own theory on product qualities and users' needs. The three levels proposed by Jordan were functionality, usability and pleasure. Within Jordan's (2000) theoretical framework, he combined Tiger's (1992) theory to divide the element of pleasure into four dimensions: physio-pleasure, psycho-pleasure, socio-pleasure, and ideo-pleasure. Norman (2004) came up with the concept of 'emotional design', which stressed the importance of emotional design on decision making in our daily lives. Norman further divided emotional design into three levels: visceral, behavioural, and reflective. The visceral level refers to the initial impact, which is the initial

response evoked by a product's appearance, texture and material. The behaviour level refers to an unconscious response, such as the pleasure an individual experiences after taking a shower, while the reflective level refers to an individual's conscious response to the product.

As for the assessment of emotions, there are a number of emotional scales and techniques recorded in past studies. For example, Mehrabian and Russell (1974) used a 34-item questionnaire to form the PAD (Pleasure-Arousal-Dominance) dimensions model, Izard (1977) used a questionnaire with 30 adjective items to form the DES (Differential Emotions Scale), and Lang (1985) came up with a non-verbal pictorial assessment technique called SAM (Self-Assessment Manikin). These methods have been applied to the fields of consumer experience marketing and context-aware information management, which has generated effective results (Richins, 1997; Machleit and Eroglu, 2000; Huang, 2001). Nevertheless, these assessment techniques were not created for the purpose of product development. More importantly, these techniques mostly assess 'primary emotions' but do not cover the wide range of emotions involved with product experiences (Smith, 2008; Design and Emotion Society, 2006). Another tool that was often associated with emotional design was Nagamachi's (1995) concept of 'kansei engineering', which was initially proposed in the 1970s. Kansei engineering focused on a specific response that a product elicits in the user (for example, speed or advanced technology) to utilise a microscopic perspective to translate a consumer's feelings and image of a product into practical design elements.

Emotions play a large part in altering the operation of perception parameters. When a product design contains qualities of relaxation and pleasure, the design often helps the users change their thinking from a rational mode to a mode based on emotions. Furthermore, in addition to identifying the emotional dimensions of a product, specific methods need to be developed to assess the perceived value of products from an emotional perspective. These methods may adopt or modify the features of existing ones in the field of design decision making.

Design decision making and FAHP

Substantial research has been completed on quantitative analysis methods that could be used for decision making and applied to fields related to product development. Methods that are commonly used in quantitative assessment include: the grading method, the ranking method, the Delphi method, analytic hierarchy process (AHP), analytic network process (ANP), quality function deployment (QFD), multi-criterion decision making (MCDM), multi-attribute decision making (MADM) and data envelopment analysis (DEA) (Hsiao, 1998; Seydel, 2006; Wei and Chang, 2008). In the past, these quantitative

methods did not take into account the unquantifiable nature of the subjectivity and ambiguity inherent in human thinking. Therefore, many scholars started applying Zadeh's (1965) fuzzy theory to account for the shortcomings of other methods. Fuzzy theory originated from the notion of the fuzzy set as a method to quantify the subjective thinking process of human beings. Zadeh (1999) also suggested that the human language was an unquantifiable variable that could be better accounted for by using fuzzy set theory.

In addition to the vagueness of human expression, decision making always involves the consideration of various criteria at different levels of abstraction or hierarchy. Therefore, a decision method must be robust enough to deal with such conditions. AHP is the decision method that has been widely used in practice (Saaty and Takizawa, 1986).

The most distinguishing feature of AHP is its ability to decompose a complicated problem into a hierarchy of simpler elements. Then, each of the elements can be compared to one another and converted into a numerical value that can be evaluated in a process of assessment or decision making. Figure 2 shows the hierarchical structure of AHP. If Symbol A depicts the final goal, then Symbol B represents the various targets, and Symbol C represents the evaluation criteria. Together, these elements form the hierarchical structure in a decision-making plan.

Since Saaty (1980) first proposed the AHP, which was based on the pairwise comparison method, it has been modified and improved by van Laarhoven and Pedrycz (1983) as well as Buckley (1985) through the addition of fuzzy theory. The new process was renamed FAHP. The various advantages of FAHP (fuzzy analytic hierarchy process) made it a popular choice in the management decision field. Even today, FAHP is still widely used by scholars and experts for examining multi-criteria decision making.

To solve problems relevant to product design and development, some researchers applied FAHP to modular product design (Lee et al., 2001), the prioritisation of customer satisfaction attributes in target planning for automotive product development (Nepal et al., 2010), and the concept selection of automotive bumper beam design (Hambali et al., 2010).

Because the emotional responses of user experiences are always expressed using a language that has vagueness and uncertainty, FAHP is suitable for comparing design alternatives from an emotional perspective.

METHODOLOGY

Factors identification

The objective of this study was to identify the factors that influence the perceived value of a product from an emotional perspective. First of all, we held structured interviews with six professional designers as well as six consumers who were given open-ended

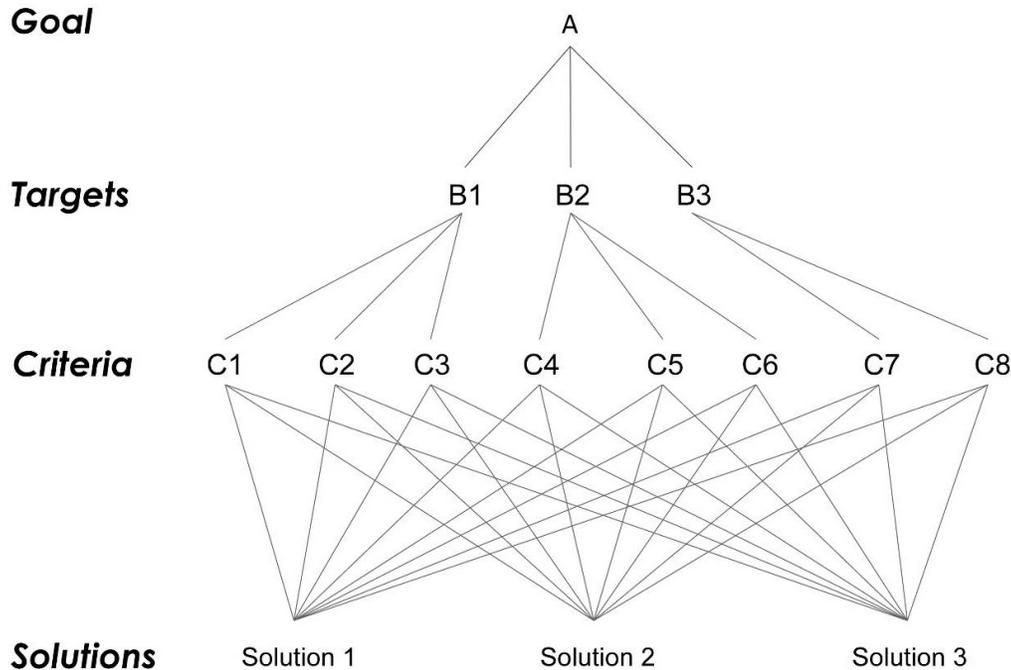


Figure 2. Hierarchical structure of AHP.

questionnaires to determine the reasons that consumers were willing to purchase a product due to its emotional value. More than 400 lines of statements were collected. Using protocol analysis, a focus group of four research members (which included two professors, one senior designer and one manager) coded the statements and grouped them into 15 characteristics that affect the perceived value of a product. The characteristics included high-quality aesthetics, worthy of collection, facilitating health and welfare (similar to 'feng shui' in traditional Chinese terminology), an interesting metaphor, special texture, a reflection of the owner's extraordinary taste, evoking memories of wonderful times, a unique style, outstanding function, a comfortable atmosphere, attractive colours, interesting background story, a reflection on the owner's professionalism, providing romantic feelings, and an eye-catching appearance.

Secondly, we included these characteristics in a subsequent questionnaire survey to extract the major dimensions. In the survey, 156 participants were invited to rate the likelihood of purchasing products due to these characteristics by using a 9-point Likert scale. This scale served a method of ascribing quantitative value to qualitative judgement. Statistical tests revealed that there was no particular bias or trend in gender, age, and educational background among these participants.

We then continued to use principal component analysis with varimax rotation to extract the major dimensions. Components with eigenvalues that were greater than one were retained. The four main characteristics represented 70.126% of the total variance. Because the loading of attractive colours and interesting background story did not exceed a variable of 0.50, these factors were omitted from the original set of characteristics. The results are included in Table 1.

The four factors were named Features, Association, Social-esteem, and Engagement, respectively (the overall process was named FASE). The dimensions of the four factors along with the remaining criteria were used together to construct a hierarchical index, which was named the FASE Index (Figure 3). This index could be used as a structure for design communication as well as

hierarchical criteria for design evaluation from an emotional perspective.

Case studies

To validate the applicability of these factors, this study included studies of two different USB flash drives to demonstrate the proposed index and evaluation method (Figure 4). The first flash drive was the 4 GB YEGO Y-shaped flash drive, which had an average selling price of NT\$ 580 (New Taiwan Dollar). The second one was a 4 GB penguin-shaped flash drive sold for \$NT 800. Both of these products were priced higher than most flash drives that have the same functions (which were priced below \$NT 320). This difference in price could be attributed to the emotional design concepts that were mentioned in a previous section. This study examined whether or not designers and consumers exhibited any differences in emotional dimensions. The designer of each flash disk was willing to participate. The main subjects for this experiment included the original designers of each flash disk as well as 12 subjects (potential consumers) who positively reviewed the product and were willing to pay a higher price for it.

To collect and calculate the data systematically, this study employed the FAHP method and pairwise comparison to compute the weight distributions of the FASE Index based on methods employed by van Laarhoven and Pedrycz (1983), Buckley (1985) and Teng and Tzeng (1996). The procedure included five steps: (1) establish a pairwise comparison matrix; (2) establish triangular fuzzy numbers; (3) establish a fuzzy positive reciprocal matrix; (4) calculate the weight of the fuzzy positive reciprocal matrix; and (5) defuzzification and normalisation. The detailed data are illustrated in the following steps.

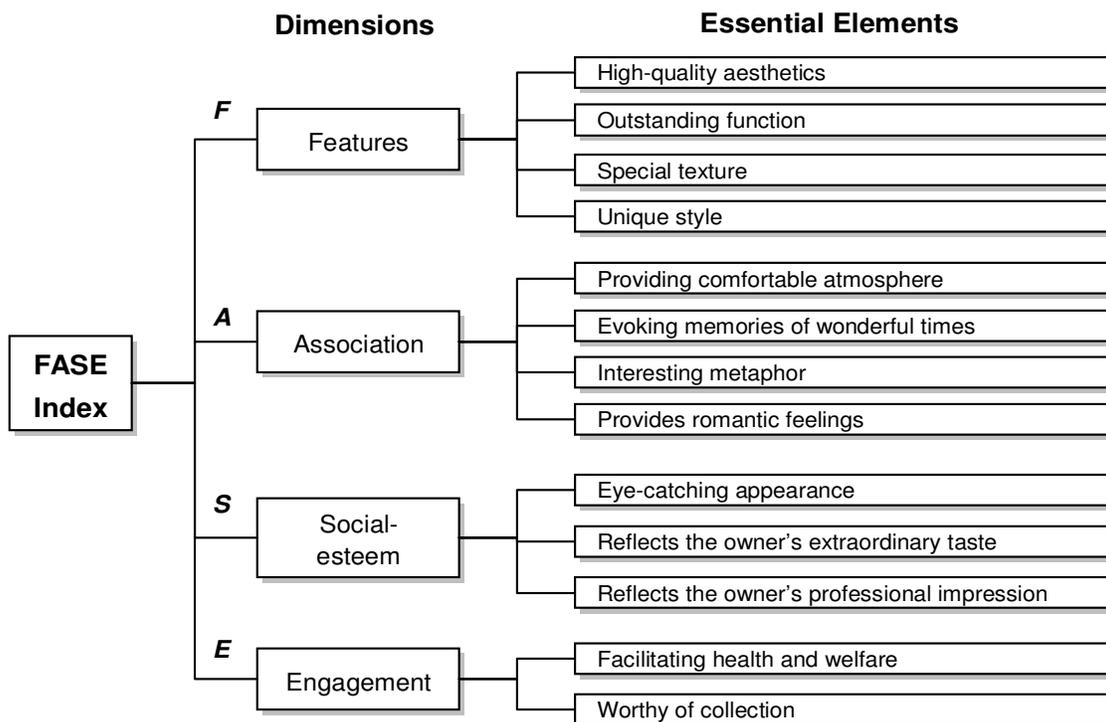
Step 1: Establishing a pairwise comparison matrix

The entries for a pairwise comparison matrix were derived by

Table 1. The result of principal component analysis for emotional dimensions.

Characteristic	Factor 1	Factor 2	Factor 3	Factor 4
High-quality aesthetics	0.761	0.069	-0.062	0.222
Special texture	0.744	0.194	0.231	-0.129
Outstanding function	0.684	-0.279	0.360	0.026
Unique style	0.662	0.258	0.395	0.009
Provides comfortable atmosphere	-0.109	0.818	-0.008	0.159
Provides romantic feelings	-0.077	0.735	0.080	0.441
Interesting metaphor	0.363	0.723	0.232	-0.082
Evoking memories of wonderful times	0.425	0.712	-0.141	0.110
Eye-catching appearance	0.030	0.182	0.838	0.126
Reflects the owner's extraordinary taste	0.187	0.075	0.836	-0.020
Reflects the owner's professionalism	0.283	-0.243	0.756	-0.103
Facilitating health and welfare	-0.029	0.177	-0.121	0.854
Worthy of collection	0.362	0.158	0.339	0.574
Eigenvalue	2.618	2.582	2.526	1.391
% Variance	20.137	19.860	19.429	10.699
Cumulative %	20.137	39.998	59.427	70.126

Bold Text indicates the absolute value of factor loading was greater than 0.5

**Figure 3.** The four dimensions and thirteen evaluation criteria in the FASE index.

calculating the relative importance of factors, which were the proportion values evaluated by participants in the questionnaire. The ratios between Factor 1 and other factors, from Factor 2 to Factor n , were expressed by $\tilde{a}_{12}, \dots, \tilde{a}_{1n}$, respectively. By sequentially calculating the degree of proportional importance between

the pairwise factors of Factor 1 and Factor n , a pairwise comparison matrix was established.

For instance, the designer of the Y-shaped flash drive (coded as Designer Y) was invited to provide the reciprocal judgment matrix based on pairwise comparison of the criteria at the FASE level.

$$\tilde{Y} = \begin{bmatrix} 1 & \tilde{a}_{12} & \dots & \tilde{a}_{1n} \\ \tilde{a}_{21} & 1 & \dots & \tilde{a}_{2n} \\ \vdots & \vdots & \dots & \vdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & \dots & 1 \end{bmatrix} = \begin{bmatrix} 1 & \tilde{a}_{12} & \dots & \tilde{a}_{1n} \\ 1/\tilde{a}_{12} & 1 & \dots & \tilde{a}_{2n} \\ \vdots & \vdots & \dots & \vdots \\ 1/\tilde{a}_{1n} & 1/\tilde{a}_{2n} & \dots & 1 \end{bmatrix} = \begin{matrix} F & A & S & E \\ F & \begin{bmatrix} 1 & \tilde{3} & \tilde{4} & \tilde{3} \\ \tilde{3}^{-1} & 1 & \tilde{3} & \tilde{3} \\ \tilde{4}^{-1} & \tilde{3}^{-1} & 1 & \tilde{3}^{-1} \\ \tilde{3}^{-1} & \tilde{3}^{-1} & \tilde{3} & 1 \end{bmatrix} \end{matrix}$$

Step 2: Establishing triangular fuzzy numbers

To fuzzify the number, we used triangular fuzzy numbers (TFN) as defined by van Laarhoven and Pedrycz (1983). Because the assessment model for this study used natural language as its linguistic variable, we used Absolutely, Very Strongly, Essentially, Weakly and Equally to express the degree of importance provided by the assessor.

These linguistic variables were converted into fuzzy numbers to calculate the actual emotional value for each assessed factor. The linguistic standards and triangular fuzzy numbers are listed in Table 2.

$$\tilde{r}_i = \left(\prod_{j=1}^n a_{ij} \right)^{1/n} = ((1 \times 2 \times 3 \times 2), (1 \times 3 \times 4 \times 3), (1 \times 4 \times 5 \times 4))^{1/4} = (1.86121, 2.44949, 2.990698)$$

Similarly, the remaining \tilde{r}_i was obtained. Next, the fuzzy weight value in each row of the matrix could be calculated.

$$\tilde{Y}_1 = \tilde{r}_1 \otimes (\tilde{r}_1 \oplus \tilde{r}_2 \oplus \tilde{r}_3 \oplus \tilde{r}_4)^{-1} = (0.298173, 0.4994938, 0.80384)$$

Using the same method, the fuzzy weight value \tilde{Y}_i could be obtained to construct the fuzzy weight matrix \tilde{Y}_{FASE} .

$$\tilde{Y}_{FASE} = \begin{matrix} F & \begin{bmatrix} (0.29817, 0.49949, 0.80384) \\ (0.16020, 0.26837, 0.45203) \\ (0.05756, 0.09213, 0.17174) \\ (0.08010, 0.14001, 0.25013) \end{bmatrix} \\ A \\ S \\ E \end{matrix}$$

Step 4: Defuzzification and hierarchical association

Because the weight for every assessed item that was obtained is a fuzzy number, defuzzification must be utilised to convert them into non fuzzy values. This study uses the centre of gravity method proposed by Teng and Tzeng (1996) for defuzzification, which aimed to solve the gravity of triangulations and to find the central value for entire fuzzy sets. For instance, the crisp values of DF_{Y_1} were calculated as follows:

$$DF_{Y_1} = \frac{(uw_i - lw_i) + (mw_i - lw_i)}{3} + lw_i = 0.53384$$

The weight matrix DF_Y could be constructed row by row with the same procedures. Furthermore, to integrate the matrix derived from

We then expanded each element of the matrix according to the definition of the triangular fuzzy number as follows:

$$\tilde{Y} = \begin{matrix} & F & A & S & E \\ F & \begin{bmatrix} 1 & (2, 3, 4) & (3, 4, 5) & (2, 3, 4) \\ (0.25, 0.33, 0.50) & 1 & (2, 3, 4) & (2, 3, 4) \\ (0.20, 0.25, 0.33) & (0.25, 0.33, 0.50) & 1 & (0.25, 0.33, 0.50) \\ (0.25, 0.33, 0.50) & (0.25, 0.33, 0.50) & (2, 3, 4) & 1 \end{bmatrix} \end{matrix}$$

Step 3: Calculating fuzzy weight

We used Buckley's (1985) approximation method to calculate fuzzy weight distribution. The approximation method not only considered consistency but also incorporated the concept of normalisation. The formulas below were used to obtain the fuzzy weight. The geometric mean of the respondent's triangular fuzzy number of \tilde{r}_1 in the matrix could be calculated as follows:

sub-criteria, the normalised weight matrix NW_{FASE}^Y was obtained as follows:

$$DF_Y = \begin{matrix} F & \begin{bmatrix} 0.53384 \\ 0.29354 \\ 0.10714 \\ 0.15675 \end{bmatrix} \\ A \\ S \\ E \end{matrix}, NW_{FASE}^Y = \frac{DF_{wi}}{\sum DF_{wi}} = \begin{matrix} F & \begin{bmatrix} 0.48919 \\ 0.26899 \\ 0.09818 \\ 0.14364 \end{bmatrix} \\ A \\ S \\ E \end{matrix}$$

Repeating the aforementioned steps, the weights of the thirteen sub-criteria at the second level could be obtained. For instance, the matrix of the four sub-criteria in the F dimension was determined as follows:

$$NW_F^Y = \begin{matrix} F_1 & \begin{bmatrix} 0.11389 \\ 0.06312 \\ 0.29470 \\ 0.52829 \end{bmatrix} \\ F_2 \\ F_3 \\ F_4 \end{matrix}$$

to obtain the overall weight of the p-th sub-criteria at the second layer of the i-th dimension at the first layer, we aggregated the weights by multiplication. Using the mechanical aesthetic sub-criterion of the F dimension as an example, the final weight value of such a sub-criterion could be aggregated as follows:

$$OW_p = NW_i \times NW_{ip} = 0.48919 \times 0.11389 = 0.05572$$

The final FASE Index weight results for Designer Y are listed in Table 3.

Using the same method, the FASE Index weight results for the designer of the penguin flash drive (coded as Designer P) are



Figure 4. Pictures of the two USB flash drives selected for the focus group in this case study.

Table 2. Triangular fuzzy numbers.

Fuzzy number	Linguistic scale	Positive triangular fuzzy number
$\tilde{9}$	Absolutely	(8, 9, 9)
$\tilde{8}$	Intermediate	(7, 8, 9)
$\tilde{7}$	Very strongly	(6, 7, 8)
$\tilde{6}$	Intermediate	(5, 6, 7)
$\tilde{5}$	Essentially	(4, 5, 6)
$\tilde{4}$	Intermediate	(3, 4, 5)
$\tilde{3}$	Weakly	(2, 3, 4)
$\tilde{2}$	Intermediate	(1, 2, 3)
$\tilde{1}$	Equally	(1, 1, 2)

shown in Table 4.

To compare the responses from twelve potential consumers, the authors repeated the above steps for both the Y-shaped and penguin flash drives to obtain weights from the potential consumers at the first level (Table 5).

Following the same procedures, the aggregated weights of the thirteen sub-criteria for Y-shaped and Penguin flash drives were obtained and listed in Tables 6 and 7, respectively.

RESULTS AND DISCUSSION

To study whether the FASE index could reflect the properties of different sample products, we conducted a chi-square test on the frequency of dominance among four dimensions collected from 12 potential consumers. The results showed that there was no significant correlation between the Y-shaped flash drive and the Penguin flash drive ($\chi^2_{(3)} = 2.591$, $p = .459 > 0.05$). The following radar chart (Figure 5) also illustrates the differences in the FASE Index for these two sample products. Compared to the Penguin flash drive, the Y-shaped flash drive was superior in the Social-esteem dimension. However, the Y-

shaped flash drive did not offer enough engagement and association compared to the Penguin flash drive.

Furthermore, for the Y-shaped flash drives, the weight distribution for the thirteen sub-criteria between the designers and the potential consumers showed a significant correlation (Pearson Correlation = 0.576, $p = 0.037 < 0.05$). For the penguin flash drive, the Pearson Correlation was as high as 0.667 ($p = 0.013 < 0.05$), which was also a strong correlation. The weight distributions of the thirteen sub-criteria of the Y-shaped flash drive are illustrated in Figure 6. The two curved lines demonstrate that there were similar trends; although the weight values for F4 (high-quality aesthetics) were not consistent with the predictions of the designers. The weight distribution diagram of the thirteen sub-criteria for the penguin flash drive is presented in Figure 7. The trends were similar to the trends for the Y-shaped flash drive. The lines differed only at two sub-criteria. For A3 (interesting metaphor), consumers did not have an experience as high as the designer's predictions. For E2 (worth as part of a collection), consumers' weights were higher than the initial predictions of the designer.

Table 4. FASE Index weights (from the designer of the penguin flash drive).

Dimension	Weight	Rank	Sub-criteria	Final weight	Rank
F	0.32242	2	F1	0.01396	12
			F2	0.09086	5
			F3	0.04272	8
			F4	0.17487	2
A	0.43372	1	A1	0.03365	9
			A2	0.08785	6
			A3	0.24420	1
			A4	0.06802	7
S	0.12919	3	S1	0.09396	4
			S2	0.02449	10
			S3	0.01074	13
E	0.11467	4	E1	0.01442	11
			E2	0.10025	3

Table 5. FASE weight values from potential consumers.

Yego Y- shaped flash drive	F	A	S	E
U1	0.2900	0.4923	0.1511	0.0666
U2	0.2775	0.1250	0.5337	0.0638
U3	0.5571	0.1201	0.2667	0.0561
U4	0.2900	0.1511	0.4923	0.0666
U5	0.1396	0.4288	0.0951	0.3365
U6	0.1661	0.3900	0.0979	0.3460
U7	0.3900	0.0979	0.3460	0.1661
U8	0.4501	0.1072	0.0601	0.3826
U9	0.6397	0.0810	0.1958	0.0835
U10	0.5337	0.0638	0.2775	0.1250
U11	0.5040	0.1547	0.0788	0.2625
U12	0.0799	0.1924	0.5107	0.2170
Dominant frequency	6	3	3	0
Mean	0.3598	0.20035	0.25882	0.18102
Penguin flash drive				
U1	0.6479	0.0981	0.2067	0.0473
U2	0.5494	0.1050	0.0931	0.2525
U3	0.0899	0.6009	0.0575	0.2517
U4	0.0683	0.4115	0.1549	0.3654
U5	0.0969	0.4622	0.0624	0.3784
U6	0.3147	0.3149	0.0661	0.3043
U7	0.3460	0.3900	0.1661	0.0979
U8	0.2222	0.0539	0.6084	0.1154
U9	0.4402	0.0893	0.0793	0.3912
U10	0.2818	0.1325	0.0433	0.5424
U11	0.5107	0.2170	0.0799	0.1924
U12	0.3392	0.2999	0.1192	0.2418
Dominant frequency	5	5	1	1
Mean	0.32559	0.26461	0.14474	0.26506

Table 6. FASE Index weights (from the 12 potential consumers' evaluations of the Y-shaped flash drive).

Dimension	Weight	Rank	Sub-criteria	Final weight	Rank
F	0.35981	1	F1	0.03592	11
			F2	0.04131	8
			F3	0.18424	1
			F4	0.09834	5
A	0.20035	3	A1	0.04058	9
			A2	0.03220	12
			A3	0.09922	4
			A4	0.02835	13
S	0.25882	2	S1	0.12048	3
			S2	0.07699	6
			S3	0.06134	7
E	0.18102	4	E1	0.04016	10
			E2	0.14086	2

Table 7. FASE Index weight (from the 12 potential consumers' evaluations of the Penguin flash drive).

Dimension	Weight	Rank	Sub-criterion	Final weight	Rank
F	0.32559	1	F1	0.02947	11
			F2	0.09367	5
			F3	0.03931	8
			F4	0.16314	2
A	0.26461	3	A1	0.03730	9
			A2	0.04739	7
			A3	0.11451	3
			A4	0.06540	6
S	0.14474	4	S1	0.10069	4
			S2	0.02800	12
			S3	0.01605	13
E	0.26506	2	E1	0.03609	10
			E2	0.22897	1

From the case study, the designer of the Y-shaped flash drive believed that the first five characteristics of this drive were "outstanding function, high-quality aesthetics, evoking wonderful memories, interesting metaphor and worthy of collection". However, the first five characteristics perceived by potential consumers were outstanding function, high-quality aesthetic, interesting metaphor, eye-catching appearance, and worthy of collection. The results demonstrate that the designer and the consumers had four items in common among the first five characteristics. The averages of the two groups were 0.076 and 0.056 for the penguin flash drive, and the correlation

between the two was 0.508. The t test results ($t_{(12)}=1.180$, $p=0.261>0.05$) showed that the experiences of designers and potential consumers did not have significant differences in the second layer. Upon further observation of the penguin flash drive, the designer considered interesting metaphor, high-quality aesthetic, worthy of collection, eye-catching appearance, and special texture to be the most important characteristics. Consumers considered worthy of collection, high-quality aesthetic, interesting metaphor, eye-catching appearance, and *special texture* to be the most important characteristics. Although the rank orders of these characteristics were

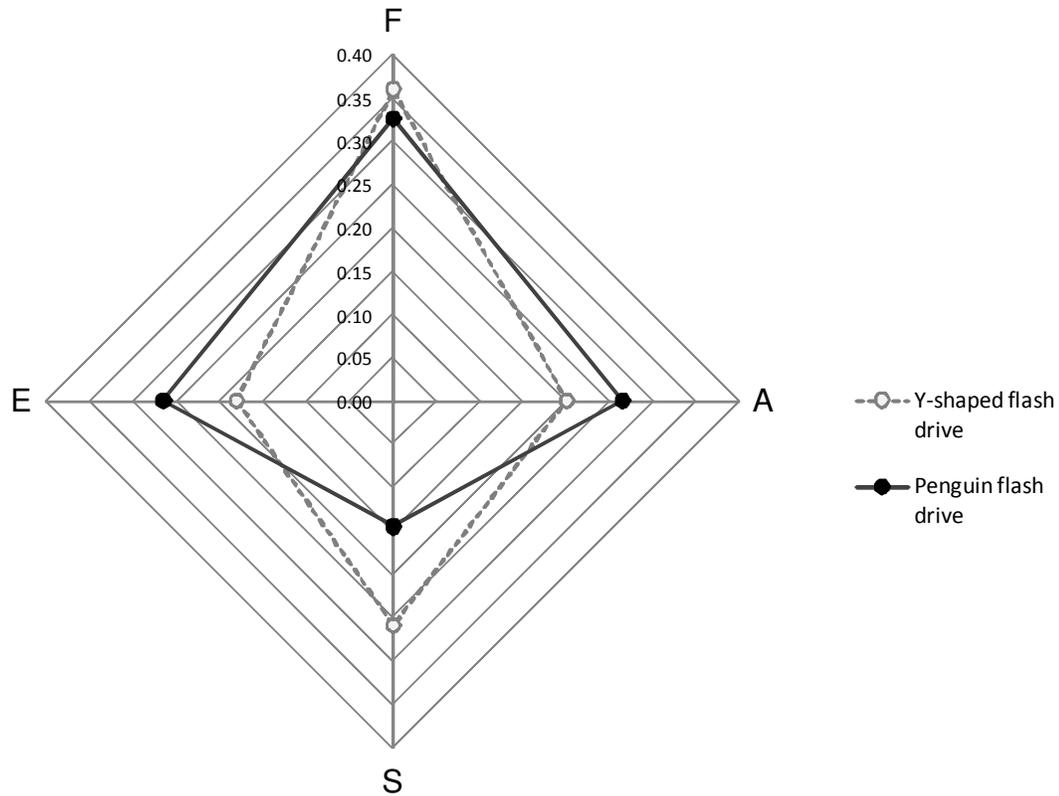


Figure 5. A radar diagram of the evaluation results for the two flash drives.

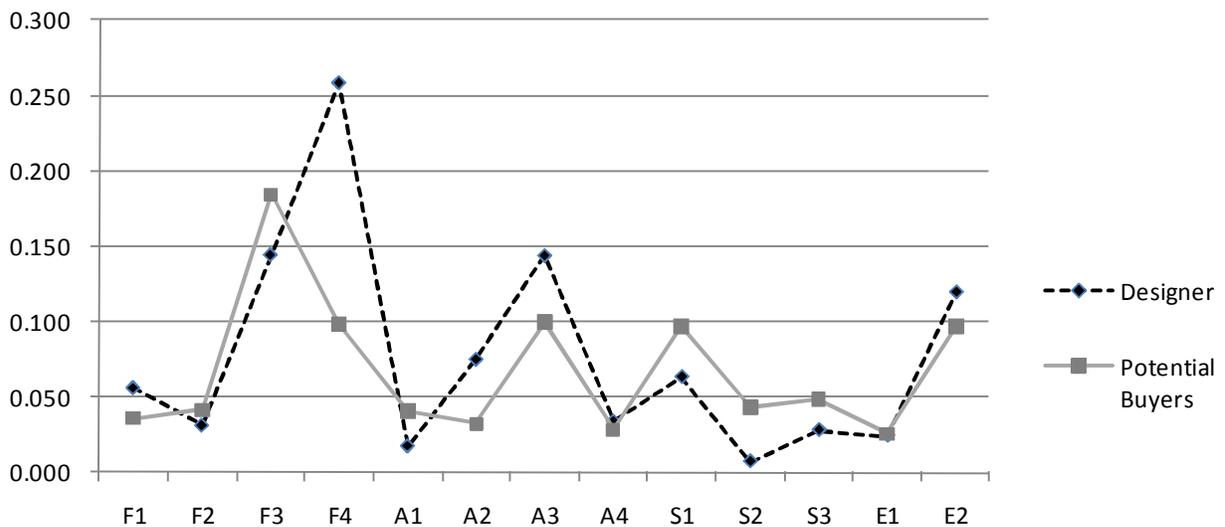


Figure 6. Line graph of the 13 sub-criteria for the Y-shaped flash drive.

different, the first five characteristics were the same. Based on the statistics for the two flash drives, the weights of proposed emotional dimensions from the original designers and potential consumers did not result in significant differences. However, it was interesting to note that within the four main dimensions of the first

layer, the S (Social-esteem) dimension had different results between designers and customers. In other words, consumers would like to purchase the flash drive because they hoped it would have an eye-catching appearance, but the designer did not have similar expectations. This difference could be attributed to the modesty

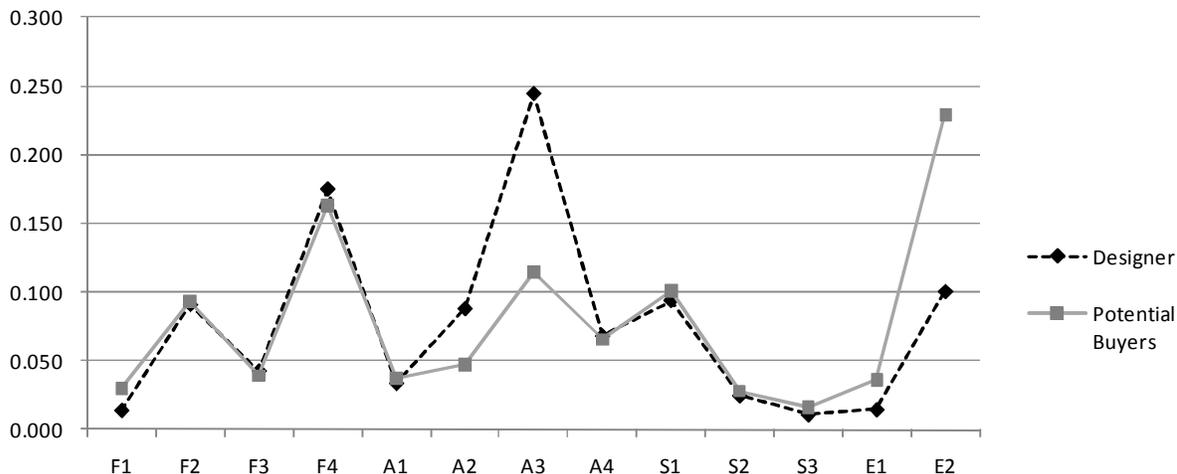


Figure 7. Line graph of the 13 sub-criteria for the Penguin flash drive.

of the designer or due to the fact that this product won an international design award and was well-known, which may have led the consumer to feel proud of owning it.

Interesting results also appeared among the sub-criteria. Although four out of the five main characteristics for the experiences of designers and potential consumers were the same, the eye-catching appearance characteristic perceived by customers was not one of the original expectations of the designer. In contrast, the designer hoped to bring out the concept of wearing an Asian school uniform to achieve the goal of evoking memories of wonderful times in childhood, but failed to deliver that message to consumers. This finding could possibly be attributed to the fact that the personal experiences of designers and potential consumers are different.

Conclusion

This study summed up 400 lines of statements for consumer case studies and based on protocol analysis, these statements were converted into 15 elements that encompass the emotional factors that affect the perceived value of products. Then, we used the data from 159 questionnaires as well as principal component analysis to extract the four main emotional dimensions: Features (F); Association (A); Social-esteem (S) and Engagement (E). The index of these four main dimensions was called the FASE Index. Then, we used FAHP to evaluate products in case studies.

To conduct an experiment, this study used two different USB flash drives that were in great demand and sold at noticeably higher prices than other flash drives. The results of this experiment showed that the FASE Index could effectively calculate the emotional dimension of a product in a quantitative manner. The cases used in this study also showed that the FASE index was sensitive to

different products. In addition, for successful products, the differences in the experiences between designers and potential consumers were minimal.

Application of the FASE Index could allow designers to design their products based on the characteristics expected by their potential clients and to avoid situations in which designers and clients fail to communicate properly. In addition, suppliers could categorise their products according to the FASE Index by using the index to define the unique characteristics of a product or design project. This organisation could be beneficial for marketing specialists when they are carrying out market segmentation analysis and competitor analysis.

Although the FASE index has been developed, there are some other research issues. For example, if a company would like to develop product alternatives targeting diverse customers across different cultures, how to correctly assessing the weighting among emotional dimensions become an important issue. Furthermore, when a product design team would like to use the FASE index for evaluating design alternatives, how to aggregate the results from members with different experiences remains an open question. These research directions deserve further studies in the future.

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Full Length Research Paper

Social responsibility of small businesses in a typical rural African setting: Some insights from a South African study

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This study examined the extent to which the concept of social responsibility has permeated the small business mind set of a typical rural African setting located in South African. In order to achieve the above purpose, five hypotheses focusing on social responsibility awareness, performance, focus, perceived benefits, and observable benefits were formulated and tested. The results reveal high levels of awareness and performance of socially responsible activities among the small businesses surveyed. The results further suggest that these businesses may be performing these socially responsible activities with expectations of certain benefits. The results confirm customer, employee, and community issues are important social responsibility activities for the small businesses surveyed. The study illuminates the practice of social responsibility among small businesses in the African context with particular focus on rural communities where these types of businesses are the only form of economic activity hence avenue for social transformation. Those interested in the BSR phenomenon will find it useful in research and policy formulation and implementation efforts. Small business owners will have reliable information to guide their BSR efforts. The study is limited to a small geographical area of one African country thus may raise questions about generalizability of results. However, with the known similarity in many African conditions particularly in rural areas where customs, beliefs, and socio-economic conditions have been found to be similar in many respects, the current study provides a basis for future research on a larger and multi-national scale.

Key words: Business social responsibility (BSR), small business, community related activities, customer related activities, employee related activities.

INTRODUCTION

Like most African countries, post-apartheid South Africa faces and has to deal with numerous socio-economic problems but notably very high rates of unemployment, rising socio economic inequality, and high levels of poverty in rural areas.

The Greater Taung Local Municipality where the research was conducted is a typical rural area situated within the southern part of the Bophirima District of the North West province of South Africa. The most recent socio economic statistics available on the Greater Taung Local Municipality office shows that: The area covers about 5649 km², it has a population of 184482 with a density of 33 people per km², the average household size is about 5 people, majority of the households earns

incomes below the national minimum wage; about 23% of the households earn no income at all; almost 62% earn less than R501.00 (about \$62) per month; the unemployment figure is at about 63%.

Except for Taung-Tusk hotel, which can be classified as big business in accordance with national standards, the rest of the businesses are small or micro in nature and dominated by small retailers. These small firms form the main source of economic activity in an area that is far removed from large commercial towns and characterised by poverty, high unemployment rate and low level of development. With this type of statistics, the Greater Taung Local Municipality can be described as a typical underdeveloped and impoverished rural area.

While South Africa battles with these types of social problems which are in fact not confined to but evidently more prevalent in rural areas small businesses have emerged as the main vehicle to use. In rural areas, due to sparse population, the existence of large enterprises cannot be justified hence the only viable means of economic activity in such areas is through small businesses (Botha and Visagie, 1998).

This statement gives an indication of the potential role of a dynamic small business sector in helping solve some of the many pressing socio economic problems of rural communities in African countries. Unfortunately, small businesses have been found to be limited in their ability to play any meaningful role as they hardly grow to create more jobs. This notwithstanding, experts believe that compared to larger organisations, small businesses can make more impact in their communities by voluntarily participating in social activities (Dzansi, 2004). This means that small businesses that operate in rural communities will be able to play bigger roles in uplifting the social and economic conditions of those rural communities in which they trade if they engage in socially responsible practices in the communities. In other words small businesses in rural communities must embrace the concept of business social responsibility (BSR) in order to have greater impact in the communities in which they do business.

It is important at this stage to point out that although social responsibility as a business concept has gained much acceptance, there are still many unresolved issues. For example, even the casual reader of BSR literature will notice lots of differences in the terminologies assigned to the concept. It is therefore, important to explain the author's position. The author breaks from popular practice and uses the more neutral term business social responsibility (BSR) to refer to the concept believing that, terminologies such as corporate social responsibility CSR; corporate social performance - CSP; corporate social investment – CSI; etc., all carry a somewhat “big business only” connotation; yet this may not be the case. In fact, the term BSR seems more appropriate because it accommodates smaller organisations as well more so when it is clear that smaller businesses now occupy centre stage in the general business/society relationship debate.

While conceptual uncertainty still exists, two other important BSR issues are however, no longer disputable. Firstly, the notion that companies owe duty to constituents other than owners is now a consensus. Secondly, it is now accepted that firms irrespective of size need to establish long-term relationship with their communities for their own good and that of the communities in which they operate - a kind of symbiotic relationship that simultaneously benefits businesses and their communities. Alexander (2002) aptly highlights the importance of this symbiotic relationship as follows: “Social responsibility offers a new alternative to the idea that economic and

social goals must always be in conflict. It offers an integrated approach to business in the modern world. It shows the way forward, to achieve economic, social and environmental benefits at the same time”

Thus, it is important that firms irrespective of size establish long-term relationships with their communities for their own good just as it could lead to better lives for the communities in which they operate. However, to establish mutual relationship to the extent that it is long lasting would require ethical behaviour over and above what the law stipulates. It is this kind of discretionary behaviour by business that is commonly referred to in the literature as corporate social responsibility (CSR) but which this author preferably calls business socially responsibility (BSR).

Defining business social responsibility

There are numerous definitions for BSR in the literature with some of the notable ones being: “A business's obligation to seek socially beneficial results along with economically beneficial results in its policies, decisions and actions” (Kyambalesa, 1994).

“The continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large (World Business Council for Sustainable Development” (WBCSD), (2001).

“A company's commitment to operate in economically and environmentally sustainable manner while recognising the interest of its stakeholders. Stakeholders include investors, customers, employees, business partners, local communities, the environment, and society at large” (Peyton, 2003).

“A concept which encourages organisations to consider the interest of society by taking responsibility for the impact of its activities on customers, employees, shareholders, communities and environment in all aspects of its operations” (Centre of Strategic Research and Development of Georgia, 2007).

“A firm's commitment to operating a business in an economically sustainable manner while at the same time recognising the interests of its other stakeholders (customers, employees, business partners, local communities, society at large) over and above what the law prescribes” (Dzansi and Pretorius, 2009).

Examination of the above definitions shows no major differences and indicates a consensus that, in pursuing owners' interest, owners or their agents must not forget the needs of other stakeholders of the business because these people are capable of impacting negatively on the bottom-line of the business. For the purpose of this study, Dzansi and Pretorius, (2009) definition above was adopted.

Adoption of this definition made it possible to utilise the

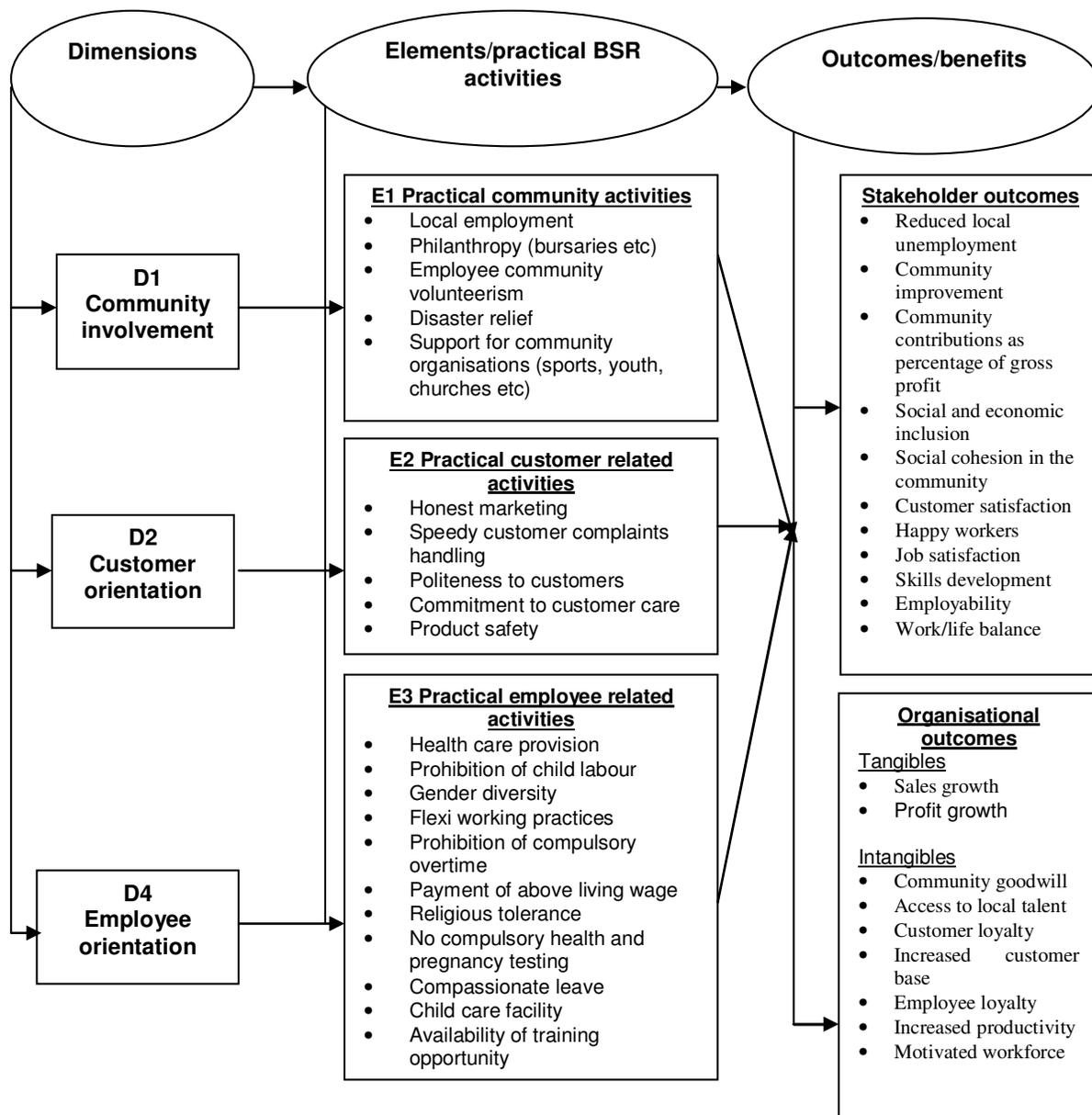


Figure 1. Components of the SMME-BSR framework.
Source: Dzansi (2009)

accompanying Dzansi and Pretorius' (2009) framework (Figure 1) for measuring BSR in smaller business for the empirical research.

Why does BSR matter so much for small businesses that operate in rural areas of Africa?

Kapp (1978), in his book 'the social costs of business enterprise' highlighted the failure of businesses to take responsibility for their negative actions in society. Kapp (1978) pointed out that the social costs of businesses are

usually not sufficiently accounted for by businesses but are usually shifted to and often borne by communities. Kapp (1978) admits that economic progress has been accelerated through business enterprises but argues that more often than not, it is society alone and not business that pays the price for this progress in the form of societal costs such as air and water pollution, disease, and other negative externalities. Baker (2004) adds that businesses do most damage to the poor by ignoring them and their needs altogether. Thus, it is only morally right for businesses to contribute more towards socio-economic upliftment of communities in which they trade.

Although BSR has largely been discussed in the context of big enterprises, it is now becoming clearer that the concept is very relevant to small businesses particularly in economically depressed areas of African countries where the critical role of small businesses in social transformation is becoming more and more indisputable. In fact, for smaller businesses doing business in rural areas of Africa, there seems to be very compelling reasons for being socially responsible. For instance, Visser (2007) makes the point that in rural areas of South Africa where social crises are most felt small businesses remain the main vehicle to use. This belief is largely due to the fact that in rural areas, due to sparse population, the existence of large enterprises cannot be justified hence the only viable means of meaningful economic activity is through small businesses.

It is quite true that the normal role of small business has always been job creation. It is also true that research has shown that small businesses located in rural areas of Africa are unable to fulfil this role. In spite of this limitation, Dzansi and Pretorius (2009) argued that small businesses can still play a key role in rural areas of Africa by becoming socially responsible.

Increasing small businesses' involvement in BSR

Small businesses wherever they are will have to institutionalise BSR to fully fulfil their role in society. The Canadian Co-operative Association (2003) highlights that: "In the near future, BSR will become main-stream within business and not just an add-on". For small businesses, it simply means that they too will have to integrate BSR into their core business practices.

But is the moral high ground reasoning as espoused by Kapp (1978) and the like going to encourage or compel smaller businesses to engage in activities that are evidently going to deplete their already limited resources? In answer, it is quite reasonable to suggest that the institutionalisation of BSR by businesses will be much easier to achieve if it is motivated by what benefits can be derived from engaging in it especially if small businesses with their constrained resources are to buy into it.

In other words, there has to be economic justification for smaller businesses to commit their scarce resources to it. In fact, Epstein and Roy (2003) are convinced that only by making the business case for BSR will businesses particularly the smaller ones be motivated to truly integrate BSR into their business strategies.

Fortunately, there seems to be some support for the idea that by working strategically with BSR, small businesses can enhance their own competitiveness (Danish Commerce and Companies Agency, 2008).

In fact, there are indications that there is economic justification for a business (including small businesses) to engage in socially responsible programs.

However, arguments and evidence regarding the economic justification for BSR engagement is mixed.

BSR: The economic justification debate

On the one hand, some writers on the subject starting with Friedman (1970) unequivocally condemn BSR believing that engaging in it actually depletes shareholder wealth. Some empirical studies seem to support this stand. For example, Diltz (1995); Sauer (1997); Kneader et al. (2001); and Bauer et al. (2003) could not find any relationship between the two variables in their studies. From this stand, it is often argued that if a business performs BSR, it does so only because it is the right thing to do and not because of any direct economic gains.

On the other hand, others (including the author) are convinced that BSR can be economically beneficial to businesses. A central argument for this study is that small businesses can indeed invest part of their income, other resources, and times in alleviating the societal problems plaguing rural communities yet not compromise their ultimate goal of wealth maximisation for owners. The literature search revealed eight frequently cited economic benefits for companies that engage in BSR. These include, enhanced reputation, reduced risk, increased productivity, employee satisfaction, access to capital, employee learning, the opportunity to charge premium prices, and of course better financial performance.

Some empirical studies seem to support the positive impact of BSR on business economic performance. Orlitzky et al. (2003) conducted a meta-analysis of several studies that examined the relationship between BSR and firm performance and concluded that it pays to be socially responsible. Wingard (2001) also found a positive correlation between environmental responsibility and the performance of South African listed companies; that is, the higher the environmental responsibility of a company is, the higher is the financial performance of that company. Although these studies have largely focused on big companies, they show that a business can behave in a socially responsible manner and still add to shareholder wealth. Thus, while there is a very strong economic motivation for engaging in BSR, this does not necessarily apply to small businesses. Therefore, there is need to explore this missing link for smaller organisations.

Importance of the current study

Involving small businesses in Africa particularly those in the rural areas in social responsibility programmes will require making small businesses to buy into the idea of BSR. This will require empirical research to provide guidance in terms of BSR what is going on, working, and not working, focus of those doing it, specific activities for smaller businesses, and most importantly BSR performance/firm performance relationship. This guidance is still lacking mainly because of dearth of focused research.

In addition, the current study is important for the following

reasons. Firstly, small businesses are generally known to be different in many ways from larger organizations. This means that BSR agenda for small businesses may not be the same as those for larger businesses. Secondly, BSR is not the same everywhere across the globe (Visser, 2007). Thus, for example the BSR agenda of small businesses in Africa might not be the same as those of the developed world where much work has been done. Thirdly, while it is true that BSR conferences and awards are increasingly mushrooming in African countries around the world and some aspects of BSR are indeed “migrating from the West to the rest” as Mehra (2006) puts it, “it does not necessarily mean that the BSR concept in its entirety is alien to Africa. Neither does it mean some kind of Western ‘colonisation’ of the BSR concept in Africa”. Rather, based on Dzansi and Pretorius (2009) views about the role of the African value system “UBUNTU” in BSR, it is reasonable to say that the motivation for BSR and the BSR focus of small businesses in African country like South Africa would naturally differ from those of other countries. Phillips (2006) provides compelling reasons in support of this argument. In the words of Phillips (2006), “Africa’s collective approach to problem-solving and the impact of the extended-family system, reinforced by the strong ‘village’ community mentality and philosophy, are all indicative of an inherently socially responsible people”. Thus according to Phillips (2006), Africans have long been socially responsible with their own approach to social responsibility.

Social responsibility can then be seen as a concept that derives from the African value system. Phillips (2006) actually believes that the Western exported form of social responsibility unlike the African conceptualisation is all about responding to the social needs of stakeholders than it being part of their value system. In other words, Western conceptualisation of BSR is not in sync with what the African value system determines to be important social responsibility activities of business. No wonder, Phillips (2006) asked: What is important for Africa? To what extent are CSR practices influenced by the local context? In short, all that Phillips (2006) appears to be saying is that the African way of thinking about BSR is values driven whereas the Western one is not.

Another importance of this study is that, appropriate policies to foster BSR in small businesses may never materialize in Africa unless empirical research that provides scientific information for policy makers is intensified. Moreover, the situation where Africa lags behind other regions of the world in terms of research into BSR in small businesses or does not pay much attention to small businesses related BSR research leads to a situation where Africa will ever remain a dumping ground for unsuitable BSR policies and procedures designed for the developed world.

Finally but not the least, as Hopkins (no date) observed, BSR differs from country to country and cultures affect how consumers expect businesses to behave.

The interpretation of BSR therefore differs from country to country. Therefore, as Visser (2007) points out, understanding small business/BSR interface in other regions or countries of the world may not provide an understanding of the phenomenon in the South African rural contexts.

Conceptualising BSR for measurement in small businesses

From the literature, BSR appears to be directed at stakeholders and characterised by activities in three ways. (1) it consists of voluntary activities that go beyond legal and contractual requirement – for example, paying above minimum wage; (2) activities are performed to benefit employees and other business relevant groups (stakeholders) such as customers and local community – for example providing day care service for employees’ children; and (3) the activities are regular rather than sporadic – in other words, activities are more part of business strategy than being ad hoc.

According to Laczniak and Murphy (1993), a firm’s stakeholders can be classified as primary or secondary. These authors refer to those groups or people who have the capacity to influence or are affected by the business but who are not essential to the survival of the business as secondary stakeholders. On the other hand, primary stakeholders of a business refer to those without whose full cooperation, a business will not continue for a reasonable period of time. Dzansi and Pretorius (2009) believe owners, customers, employees, and local communities are the most influential primary stakeholders of small businesses. This study is based on the framework illustrated in Figure 1 and focused on activities directed at employees, customers, and the immediate communities of the participating businesses.

To surmise, although the concept covers a wide spectrum of business and society relationship, essentially, BSR seems to mean that businesses integrate social concerns in their business operations and in their interaction with business relevant groups on a voluntary basis. In certain instances, environmental issues are classified under BSR. However, from the triple bottom line perspective, environmental issues form a separate leg of sustainable business practice. Therefore, the conceptualisation of BSR for measurement in this study does not include environmental issues. In any case, as Dzansi and Pretorius (2009) point out, environmentalism is not likely to be a major issue for smaller organisations for various reasons.

Problem statement

The problem is that, although the concept of BSR has been around South Africa for some time now with the country playing a leading role in research into the

phenomenon compared to the rest of Africa, most of the empirical research literature seems to centre on large businesses (Dzansi and Pretorius, 2009). Furthermore, whilst a lot has been done on smaller organisations in the West, to date, only scant empirical evidence of what, how, and the extent to which small businesses in South Africa are faring in the social responsibility agenda can be found. This would suggest that BSR is not taken seriously by small businesses in this part of the world and more so in the rural communities. In fact, the topic as it relates to smaller types of businesses in South Africa remains less researched. This limits the understanding of the phenomenon in respect to South African small businesses. Thus one cannot for example tell with any level of certainty what the level of BSR awareness, performance, and preferred practices of South African small businesses are. The question therefore remains: Is the concept taken seriously at all by small businesses in this part of the world?

Besides, BSR may not be the same everywhere across the globe. Rather, it differs from country to country (Visser, 2007); the interpretation of BSR therefore, naturally differs from country to country (Hopkins, no date); and customs and beliefs dictate what activities businesses are likely to engage in (Visser, 2007). Thus even in Africa, small business BSR may differ depending on size of business, country, and context (rural or urban). Consequently, there is need to conduct empirical research in these areas.

METHODOLOGY

Research questions and hypotheses

The purpose of this study was to determine the extent to which the concept of BSR has permeated the small business mind set of a typical rural South African setting.

Five specific research questions guided the study namely: (1) Are small businesses in the research locale aware of the concept BSR and its elements? (2) Do these small businesses perform certain selected BSR activities (customer, community, and employee related activities) to the extent that they can be classified as being socially responsible? (3) Do these small businesses regard performing BSR as beneficial to their businesses? (4) What are the main BSR activities for the businesses surveyed? (5) Are there observable benefits for these small businesses for BSR performance? Research question 4 was inferred directly from responses. However, in order to answer research questions 1, 2, 3, and 5, four hypotheses were formulated and tested respectively.

Contrary to the widely held view that small businesses hardly engage in BSR activities for various reasons, a related study by the Centre for Social Markets (2003) in the UK found that within South Asian small businesses in the UK, most of the firms not only saw BSR as an important business issue but a large majority of them actually engage in BSR activities. These and other findings of the above study greatly shaped the research questions and corresponding hypotheses tested in this study.

The widespread recognition and evidence of BSR practice reported in the UK study is an implicit indication of high level of awareness among the small businesses previously mentioned. It

will therefore, be interesting to determine how the South African small businesses fare in their level of awareness of BSR. Based on this information, the first two hypotheses tested which correspond to the first two research questions respectively were:

H₁: the small businesses surveyed are not aware of the concept BSR and its elements.

H_{1a}: the small businesses surveyed are aware of the concept BSR and its elements.

The instrument included questions/statements for respondents to indicate whether or not they are aware of the concept BSR and its elements.

H₂: the small businesses surveyed do not perform selected BSR activities to the extent that they can be classified as being socially responsible.

H_{2a}: the small businesses surveyed perform selected BSR activities to the extent that they can be classified as being socially responsible.

Respondents were required to indicate whether or not their businesses respond to certain employee, customer, and community issues.

According to the Centre for Social Markets (2003) study mentioned earlier, while there was acceptance that good BSR practice could lead to benefits for the organisation, this was not a significant factor that made the organisations engage in it. It would therefore be interesting to find out South African small businesses perception about benefits of BSR performance. Therefore, the third hypothesis tested which corresponds to research question three was:

H₃: the small businesses surveyed do not perceive BSR as beneficial to their business.

H_{3a}: the small businesses surveyed perceive BSR as beneficial to their business.

The questionnaire for this study required respondents to indicate the degree to which they agree or disagree with certain business benefits of engaging in BSR.

Research question four: "What are the main BSR activities for the businesses surveyed?" did not require a hypothesis. Instead, it was inferred from the results of the data analysis.

Research indicates that if done properly, BSR in any organisation could among others produce improved financial performance. This improved financial performance is attributed to high employee morale, lower employee turnover, increased employee productivity, customer loyalty, etc.

Therefore, the fourth hypothesis which corresponds to research question five was:

H₄: There are no observable benefits for small businesses based on BSR performance.

H_{4a}: There are observable benefits for small businesses based on BSR performance.

Respondents were asked to indicate the extent to which sales and profit have grown over the last three or more years.

Participants

The population investigated was small businesses in the Greater Taung Local Municipality. For the purpose of this study, small businesses are defined according to the national norm in South Africa as prescribed by the amended small business Act 102 of

1996. The study covered only micro and small businesses that employ between one to fifty (50) full-time workers in addition to the owner/manager as none of the businesses qualified to be classified as medium enterprise. The actual population size was difficult to determine because of the informal nature of most of the businesses and the fact that no reliable database exist. Given the high birth and attrition rate in the South African small business sector, it was always going to be difficult to obtain a reliable existing sample frame for the study. It needs to be pointed out however that the lack of reliable sample frame in small business research is not new. Instead, Curran and Blackburn (2001) have highlighted this problem as a serious handicap for all small business researchers. To address this problem training was provided to entrepreneurship students at the Vuselela Technical Training College, Taung Campus and these were used to compile a sample frame from which a simple random sample of 350 small businesses were selected.

Data collection

Face-to-face interviews were held with owner/managers where in most cases respondents had to indicate on a standard five-point Likert-scale, the degree to which they agree or disagree with an issue. Dzansi's Small Enterprise Social Responsibility Inventory (2004) was used. The Small Enterprise Social Responsibility Inventory has been tested for validity and with Cronbach Alphas well above 0.70 found to be a valid instrument for measuring BSR in small businesses (Dzansi and Pretorius, 2009).

RESULTS

Demographic data

Of the targeted 350 owners/managers, 314 availed themselves for the face-to-face interview thus yielding a response rate of 89.7%. Incorrect entries were treated as missing items (Table 1 for number of missing items) and consequently ignored in calculations.

The data in Table 1 shows that ownership/management of the small businesses is evenly distributed between both sexes. In the context of promoting gender equity in South Africa, this should be regarded as good news for policy makers who have been trying to bring women into mainstream economic activity. With about 73%, retail trading dominates the small business environment (Table 1). This is not surprising given that retail trade appears to be the easiest form of self-employment. From Table 1, about 50% of the owner managers belong to the age group 31 - 45 years. Table 1 reveals that a large majority - over 70% of the owner/managers have good education (at least matric). Training providers may be most delighted with this statistics since they may not have too much difficulty in providing further training to owner/managers given their existing educational levels. According to Table 1, more than 75% of the businesses are over five years old. The data in Table 1 indicates that Black South Africans dominate the small business environment in the Greater Taung Local Municipality with close to 50% of the market share. Given that that the Greater Taung Local Municipality is a predominantly black community,

the result is not surprising. This is encouraging because it is indication that many of the black inhabitants are taking to self-employment. Majority of the small businesses surveyed reported reasonable growth in both sales and gross profit. Table 1 show that (over 70%) of the small businesses had increasing sales and profit growth.

The sales and profit growth points to a thriving business environment in the Greater Taung Local Municipality that should encourage others to take to self-employment as a career option. Based on the demographic data in Table 1, the Greater Taung Local Municipality small business environment appears to be made up of micro, very small, and small businesses with no evidence of medium enterprises participating in the survey. This may mean that small businesses fail to grow to medium size businesses. According to Table 1, the greatest proportion (34.39%) of the businesses contributed about 3 – 4% of their annual gross profit towards BSR related activities whilst a reasonable proportion (21.34%) said they contributed 10% of gross profit to BSR. Unfortunately there was no way of verifying these claims without raising the ire of respondents. Consequently, their words were taken for it. If indeed these claims are true, one can only say that the small businesses in the Greater Taung Local Municipality are really doing their bit in terms of BSR.

Inferential statistics

However, useful descriptive analysis may be, a researcher's primary interest goes beyond mere description of samples.

Inferential analysis allows a researcher to draw conclusions about the population based on data obtained from samples (Terre Blanche and Durrheim, 2002; Collis and Hussey, 2003).

Based on the distribution of the descriptive statistics obtained for this study that showed normality, parametric analytic techniques were used to perform the inferential analysis. These included factor analysis, item analysis, Multiway analysis of variance (Multiway ANOVA), and discriminant analysis. The following results were obtained from the inferential analysis.

The first research question was: are small businesses in the research locale aware of the concept of BSR and its elements? Answering this question required the testing of the hypotheses:

H_1 : the small businesses surveyed are not aware of the concept BSR and it elements

H_{1a} : the small businesses surveyed are aware of the concept BSR and it elements.

The scale mean of 3.9753 for BSR awareness which is above the median value of 3 on a five point scale (Table 2) indicates that small businesses in the Greater Taung Local Municipality are aware of BSR and its elements.

Table 1. Demographic data.

Variable	Characteristic/description	Frequency (n)	Percentage
Gender of owner/manager	Male	169	55.05
	Female	138	44.95
	Total (7 missing)	307	100
Business by type	Hospitality	42	13.38
	Transport	22	7.00
	Retail	230	73.25
	Other (mining, health, commercial farming)	20	6.37
	Total	314	100
Owner/Manager's age (years)	19 – 30	77	25.00
	31 – 45	146	47.40
	≥46	85	27.60
	Total (6 missing)	308	100
Owner/manager's level of education	No formal education	13	4.14
	Primary (up to grade 6)	50	15.92
	Secondary (up to grade 9)	29	9.24
	Matric (up to grade 12)	85	27.07
	Post matric (diploma, degree, certificate etc)	90	28.66
	Post graduate	47	14.97
	Total	314	100
Age of business (years)	≤5	76	24.20
	6 – 10	108	34.40
	11 – 20	81	25.79
	≥21	49	15.61
	Total	314	100
Race/ethnicity of owner/manager	Afrikaner	67	21.34
	English	56	17.83
	Black	147	46.81
	Other (Chinese, Indian, Portuguese, other Asian)	44	14.02
	Total	314	100
Sales growth (%) reported for the past 3 to 5 years	Decreasing	27	8.60
	No change (0)	55	17.52
	Increasing (1-10)	73	23.25
	Increasing (11-20)	91	28.98
	Increasing (≥21)	68	21.65
	Total	314	100
Gross profit growth (%) reported for past 3 – 5 years	Decreasing	25	7.96
	No change (0)	63	20.07
	Increasing (1-10)	70	22.29
	Increasing (11-20)	95	30.25
	Increasing (≥21)	61	19.43
Total	314	100	
Number of employees besides owner/manager	1-5	157	50.00
	6-10	108	34.39
	11-26	49	15.61
	Total	314	100

Table 1. Contd.

	1-2	68	21.66
Annual BSR expenditure (%) reported	3-4	108	34.39
	5-6	71	22.61
	7-10	67	21.34
	Total	314	100

Table 2. Item analysis.

Statistic	Expected benefit	Community benefit	Realised benefit	BSR awareness/ attitude/performance	Employee practices	
Number of items	6	9	4	6	4	
VP (%)	7.4400 (24.8)	3.5883 (11.96)	1.6988 (5.66)	1.5542 (5.18)	1.8763 (6.26)	
Mean	3.8312	3.7880	3.6903	3.9753	4.4443	
Variance	0.67074	0.12213	0.43393	0.59104	0.41502	
Standard deviation	0.81899	0.34947	0.65873	0.76875	0.64422	
Cronbach alpha	0.9600	0.6969	0.8741	0.7506	0.8680	
Eigenvalue	8.40832	3.92554	2.47653	2.03830	1.68441	
Squared multiple correlation	0.966	0.823	0.925	0.904	0.894	
Canonical correlation	0.9918	0.9631	0.9480	0.9184	0.8824	
Significance of the mean deviation from midpoint value of 3	F P	17.62 <0.0001*	5.64 <0.0001*	18.63 <0.0001*	18.40 <0.0001*	9.79 <0.0001*

* = Significant at 1% level of significant.

Therefore, the null hypothesis H_1 could not be supported. The alternate hypothesis H_{1a} : The surveyed rural small businesses are aware of the concept BSR and its elements, are therefore, accepted. However, being aware does not necessarily mean that the business performs BSR.

The second research question was do these small businesses perform certain selected BSR activities (customer, community, and employee related activities) to the extent that they can be classified as being socially responsible? Answering this question required the testing of the hypotheses:

H_2 : the surveyed rural small businesses do not perform selected BSR activities to the extent that they can be classified as being socially responsible.

H_{2a} : the surveyed rural small businesses perform selected BSR activities to the extent that they can be classified as being socially responsible.

Respondents were required to indicate whether or not their businesses respond to certain employee, customer, and community issues.

The average scale mean of 4.1122 for BSR performance (Community/customer practice is

3.7880 and employee practice is 4.4443) (Table 2) compared to the midpoint value of 3 indicates that small businesses in the GTLM perform these BSR activities. Given this result, the null hypothesis H_2 is not supported. The alternate hypothesis H_{2a} : the surveyed rural small businesses perform selected BSR activities to the extent that they can be classified as being socially responsible was therefore, accepted.

The third research question investigated was: Do these small businesses regard performing BSR as beneficial to their businesses? In order to answer this question the following hypotheses

answering this question the following hypotheses were tested:

H₃: the surveyed rural small businesses do not perceive BSR as beneficial to their business.

H_{3a}: the surveyed rural small businesses perceive BSR as beneficial to their business.

The scale mean of 3.8312 for expected or perceived benefits is greater than the median value 3 (Table 2). The higher scale mean for expected/perceived benefits 3.8312 compared to the median value of 3 means the null hypothesis H₃ is not supported. Consequently, the alternative hypothesis H_{3a}: the surveyed rural small businesses perceive BSR as beneficial to their business was accepted. This indicates that the respondents regard their company's BSR activities as beneficial to their business. This finding is consistent with the high BSR awareness and performance reported earlier. The finding suggests that small businesses may be performing BSR with the expectation of benefits. It is also consistent with the findings of the Centre for Social Markets (2003) study in the UK which showed that within South Asian small businesses in the UK most of the firms saw BSR as an important business issue. This is a very important finding in the South African context. It shows that the motivation already exists (even if for selfish interest as some may suggest) for small businesses to engage in BSR activities. Thus, convincing small businesses to intensify their efforts should not be too difficult a task.

As said earlier, research question four: What are the main BSR activities for the businesses surveyed did not require a hypothesis as it could be inferred directly from the data. Item analysis showed scale mean scores that were higher than the midpoints for the factors community, customer and employee related BSR activities (Table 2). The empirical results therefore support the suggestion that small business BSR focus is likely to be community, customer or employee related since they form their most important trading partners. With mean score of 4.4 for employee issues against mean score of 3.8 for customer and community issues (Table 2) the result suggests that the small businesses surveyed might be more concerned with employee issues.

That small businesses showed higher performance in employee related activities than customer/community related activities may be explained by the fact that often most of the employees are close relatives of owner/managers hence they feel more obliged towards their wellbeing.

The reported means for the current study that are significantly higher than the midpoint values for Community/customer practices and employee relations is consistent with the views of Byrd et al. (1994); Peyton (2003); Longenecker et al. (2000); and Kyambalesa (1994) who all identified consumerism, community activities, and employee relations as the main BSR activities

small businesses are likely to engage in.

Research question five for the study was: are there observable benefits for these small businesses for BSR performance? To answer this question, the following hypotheses were tested:

H₄: There are no observable benefits for that engage in BSR activities.

H_{4a}: There are observable benefits for small businesses that engage in BSR activities.

Respondents were asked to indicate the extent to which sales and profit have grown over the last three or more years. A certain pattern seems discernible with regard to gross profit growth and Awareness/ attitude/performance. Table 3 indicates that reported gross profit growth differed significantly according to and BSR awareness/performance. There seems to be some positive relationship between awareness/attitude/ performance and reported gross profit growth with those reporting higher means for awareness/attitude also reporting higher gross profit growth of $\geq 21\%$ (Table 4). Similarly, respondents who reported the highest mean for the factor community/customer practices (3.99) also reported the highest sales growth $\geq 21\%$ (Table 4). Whether these relationships are causative were not investigated. The scale mean of 3.6903 that is significantly higher than the midpoint value of 3 (Table 4) for realised benefits shows that small businesses reported improvements in their business performance. Whether these improved performances can be attributed to their BSR performance is however, questionable. The high levels of awareness and performance reported in Table 2 and the conclusion arrived at on Hypothesis 2 however indicate a positive link (no matter how weak) between BSR performance and business performance. On the basis of this evidence, the null hypothesis H₄ was not supported. Consequently, the alternate hypothesis: H_{4a}: There are observable benefits for small businesses that engage in BSR activities were accepted. This link if true is consistent with the study of Besser et al. (1999) who found that there is a positive relationship between an entrepreneurs service to the community and business success.

In view of the debate in the literature regarding the economic benefits for small businesses that engage in BSR, and the observation of Cochran and Wood (1984) in Rieck and Hall (1998) that "If a positive relationship can be shown to exist, between financial performance and BSR actions then management might be encouraged to pursue such activities with increased vigour..." this may as well be the most important finding of this study. It in fact provides a further empirical support to normative assertions that small businesses can indeed engage in BSR and still improve shareholder wealth.

DISCUSSION

As mentioned earlier, the main aim of this study was to

Table 3. Multiway ANOVA for “BSR awareness/performance” (Factor 4).

Independent variable	BSR awareness/performance				
	Df	Sum of squares	Mean squares	F	P
Type of business (v33)	3	0.60271680	0.20090560	0.91	0.4359
Gender of owner/manager (v34)	1	0.03256643	0.03256643	0.15	0.7010
Age of owner/manager (v35)	2	0.90429676	0.45214838	2.05	0.1306
Educational level of owner/manager (v36)	5	6.45107705	1.29021541	5.85	<.0001
Business Age (v37)	3	1.21769298	0.40589766	1.84	0.1399
Ethnicity of owner/manager (v38)	3	25.03988938	8.34662979	37.87	<.0001
Sales growth (v39)	4	1.09650952	0.27412738	1.24	0.2927
Gross profit growth (40)	4	1.40300197	0.85075049	3.86	0.0046
Number of employees (41)	2	1.72477770	0.86238885	3.91	0.0211
Annual BSR expenditure (42)	3	4.40649332	1.46876444	6.66	0.0002
Total	30	42.87902191	-----	-----	-----

Table 4. Comparison of means for gross profit growth to show strength of difference.

Variable		Decreasing	No change	Increasing 1-10%	Increasing 11-20%	Increasing \geq 21%
Expected/perceived benefits	Mean	2.83 ^c	3.18 ^c	3.65 ^b	4.31 ^a	4.39 ^a
	SD	0.91	0.40	0.65	0.66	0.49
Community/customer practices	Mean	3.68 ^b	3.78 ^b	3.73 ^b	3.74 ^b	3.99 ^a
	SD	0.33	0.29	0.33	0.36	0.34
Realised benefits	Mean	2.71 ^d	3.11 ^c	3.76 ^b	3.99 ^a	4.14 ^a
	SD	0.57	0.29	0.53	0.49	0.48
BSR awareness/performance	Mean	3.26 ^c	4.19 ^a	3.73 ^b	4.02 ^a	4.25 ^a
	SD	0.95	0.81	0.71	0.70	0.52
Employee practices	Mean	3.72 ^b	4.46 ^a	4.47 ^a	4.57 ^a	4.50 ^a
	SD	0.87	0.72	0.61	0.47	0.55

All means (horizontal) with different alphabetic indicators comply with a Tukey at $p < 0.01$.

determine the extent to which the concept of BSR has permeated the small business mind-set in the Greater Taung Local Municipality, a typical South African rural setting. To form an opinion, five research questions were posed. These questions were transformed into four testable hypotheses and based on the evidence obtained through the empirical study the following final conclusions are reached.

1. Are small businesses in the research locale aware of the concept BSR and its elements? In order to answer this question the hypothesis “small businesses in the Greater Taung Local Municipality are not aware of the concept BSR and its elements” was tested. The empirical evidence did not support the acceptance of this hypothesis. Therefore, the conclusion was reached that small businesses in the research locale are aware of the concept BSR and its elements.

2. Do these small businesses engage in selected BSR activities to the extent that they can be described as being socially responsible? In order to answer this question the hypothesis “the surveyed rural small businesses do not perform BSR activities to the extent that they can be described as being socially responsible” was tested. The empirical evidence did not support the acceptance of this hypothesis. Therefore, the conclusion was reached that, the small businesses surveyed engage in BSR activities to the extent that they can be described as being socially responsible.

3. Do the small businesses surveyed regard BSR as beneficial to their businesses? In order to answer this question the hypothesis “the small businesses surveyed do not perceive BSR as beneficial to their business” was tested. The empirical evidence did not support the acceptance of this hypothesis. Therefore, the conclusion was reached that the small businesses perceive BSR as

beneficial to their business.

4. What are the main BSR activities for the businesses surveyed? Item analysis showed scale mean scores that were higher than the midpoints for community, customer and employee related BSR activities (Table 2). The empirical results therefore, seem to support the suggestion that small business BSR focus is likely to be community, customer or employee related since they form their most important trading partners. With mean score of 4.4 for employee issues against mean score of 3.8 for customer and community issues (Table 2) the result suggests that small businesses in the Greater Taung Local Municipality might be more concerned with employee issues.

5. Are there any observable positive outcomes for those small businesses that practice BSR? In order to answer this question the hypothesis "There are no observable benefits for small businesses that engage in BSR activities" was tested. The empirical evidence although somewhat weak, did not support the acceptance of this hypothesis. Therefore, the conclusion was reached that there are observable benefits for small businesses that engage in BSR activities.

Based on the aforementioned discussion, it is finally concluded that the concept of BSR has to 'some extent' permeated the small business mind set the typical rural South African setting. However, much work needs to be done to bring the level of awareness and performance to internationally acceptable level.

Conclusion

Firstly, with a scale mean of 3.9753 that is higher than the median value 3, the surveyed small businesses seem aware of the concept BSR. This finding is consistent with the results obtained in the Centre for Social Markets (2003) study that found widespread BSR practices within the South Asian small businesses. Although it may appear a bit presumptuous, given this is only one study conducted on a small scale, it nevertheless indicates that small businesses in the developing countries are after all not lagging behind their Western counterparts in terms of awareness of BSR.

Secondly, the results show that the surveyed rural small businesses engage in some BSR activities. In view of the Centre for Social Markets (2003) finding in the UK, which showed a similar trend, it is not farfetched to reiterate that BSR is no longer a preserved territory of big business.

Thirdly, it is not surprising that consumerism, community activities, and employee relations were confirmed as important BSR activities for small businesses in the Greater Taung Local Municipality. This finding is consistent with those of Byrd et al. (1994); Kyambalesa (1994);

Longenecker et al. (2000); and Peyton (2003) who also identified consumerism, community activities, and employee relation. This gives an indication that perhaps, these three activities must be some of the (if not the most) important BSR focus of small businesses. Thus, it shows that any study on small business BSR should take these factors into consideration.

Finally, the BSR expenditure of small businesses in the region is very encouraging. According to Table 1, all the businesses surveyed spent part of their earnings on BSR. The fact that some could spend as much as 10% of their gross profit (Table 1) is a clear indication that small businesses in the region take BSR seriously. Of course, one must bear in mind that these are self-reported figures that might be exaggerated.

LIMITATIONS

No research is devoid of shortcomings. Nonetheless, shortcomings (if any) of the current study should not necessarily reduce its value. Rather, addressing them in future studies should add more value.

Firstly, although the identified BSR focus of the small businesses surveyed seem to suggest a strong focus on the human aspects of BSR, because these activities were the only ones tested, they can only be regarded as key BSR activities of the small businesses surveyed and not necessarily their primary BSR focus. There could as well be more activities that these small businesses engage in but which the study did not focus on. There is therefore, need to conduct research that includes other issues in order to determine more authentic primary BSR activities of small businesses.

Secondly, inferences drawn in this study are based on self-reported data that could not be verified. It is possible that some of the information might be exaggerated or not true. It is however, assumed that owner/managers were truthful in their responses.

Thirdly, the study was conducted in a small geographical area of a rural part of South Africa. Generalizability of the findings to the rest of rural South Africa and Africa for that matter might be questioned. Whilst acknowledging this inherent limitation, as stated elsewhere in this paper, most rural parts of Africa share many similarities including lack of big business, predominance of small to micro businesses, similarities in cultures, prevalence of unemployment, commonality of the UBUNTU value system. One is therefore, convinced that the results of the current study could be generalised to most rural areas of South Africa and possibly the rest of Africa.

Fourthly, the small business sector consists of small, medium, and micro enterprises. This study did not include any medium sized business. This situation arose because no business qualified to be classified as medium enterprise. The results may therefore not reflect the status quo of BSR in all types of small businesses.

IMPLICATIONS OF THE STUDY

The findings of this study have helped clarify some pertinent issues related to BSR in small businesses in general and in rural African small business in particular.

Firstly, the findings of the current study indicate high levels of awareness of the concept BSR and its elements among the small businesses surveyed and moreover, these businesses do engage in BSR activities to the extent that they can be described as being socially responsible. Coupled with similar findings of the Centre for Social Markets (2003) study in the UK which also showed a wide spread awareness and practice of BSR in South Asian small businesses in the UK, it can be presumed that contrary to UNIDO's (2002) concern that small businesses might be having negative attitude towards BSR this may actually not be the case. Surely, the businesses surveyed would not have gone on from high levels awareness (a condition that is necessary to make an informed decision to perform or not perform BSR) to actually engage in it if they had negative attitudes towards the concept.

Secondly, the striking similarities in the findings of the current study and the 2003 UK study referred to above suggests that perhaps smaller businesses regardless of geographical location and setting (whether in Africa or Europe, rural or urban setting) have embraced the BSR concept. That is to say, unlike in the past, BSR is no longer a preserve of small businesses in the developed country context. In the same vein, one can conveniently presume that BSR is no longer a preserve of big business. What remains to be answered is given their widely acknowledged resource limitations, what are the primary motivations for small businesses engaging in BSR?

Thirdly, although this study did not set out to identify small business motivation for engaging in BSR, the findings indicate that the businesses believe their BSR activities are beneficial to their businesses. This finding is again similar to the findings of the 2003 UK study mentioned earlier. This similarity suggests that regardless of location, small businesses around the world consider BSR performance beneficial to the business. Furthermore, one can make the inference that small businesses wherever they may be, might be performing BSR with the expectation of business benefits. In other words, small businesses might be motivated to engage in BSR because of perceived benefits. The implication is that, if research can be done to confirm the business case, BSR performance of small businesses might be increased. This assumption is in tandem with the views of Cochran and Wood (1984) in Rieck and Hall (1998) who argue that "If a positive relationship can be shown to exist, between financial performance and BSR actions then management of businesses might be encouraged to pursue such activities with increased vigour..." This may as well be the most important finding of this study.

In this respect, the current study provides some useful insight. The findings of this study indicate that reported gross profit growth differed significantly according to and BSR awareness/performance. It also reveals some positive relationship between awareness/ attitude/ performance and reported gross profit growth with those reporting higher means for Awareness/attitude also reporting higher gross profit growth. Similarly, respondents who reported the highest mean for the factor community/customer practices also reported the highest sales growth. Whether these improved performances that significantly correspond to BSR awareness and performance is causative is however questionable. This study therefore provides support for Besser et al. (1999) who found that there is a positive relationship between an entrepreneurs service to the community and business success. The findings of this study and similar ones can therefore, make it easier to promote/advocate for BSR in small businesses.

As argued by Visser (2007) and Dzansi (2004), small businesses despite being limited in their ability to create jobs can nevertheless impact on socio economic development by being socially responsible. It was earlier acknowledged that small businesses in most rural parts of South Africa share many similarities including commonality of value systems. That being the case, it is quite safe to assume that the observed high level of BSR awareness and practice among the rural based small businesses surveyed is a common feature among most small businesses operating in other rural parts of South Africa - a situation that can be capitalised upon by both local and national government and NGOs in their effort to hasten socio economic development in the economically depressed rural areas of South Africa.

Some BSR commentators in South Africa have suggested that small business BSR effort is inadequate precisely due to lack of support especially from NGOs, large business and government. This observation may not be akin to South Africa only. Rather, it seems to be a common problem even identified in the developed country context. For example, according the Canadian business for social responsibility (2003), Canadian small businesses receive little support in their BSR efforts. This study is certainly not about and did not dwell on support of small business BSR effort or the lack of it and can therefore, not reasonably comment on it. However, it is quite clear from the findings in this study that the foundations of small business engagement in BSR have been laid by small businesses themselves. All that remains is for key role players including large business, government, and NGOs to take advantage of the reported existing high levels of BSR awareness and practice by providing increased moral, technical, and of course financial support to small businesses so that they can institutionalise their BSR endeavours hence increase their BSR performance. In that way, small businesses can have more impact on socio-economic development to the

extent that Dzansi (2004) and Visser (2007) believe they can.

Lastly but not the least, the findings confirm community, customer and employee related issues as key BSR active-ties for the small businesses. This finding is consistent those of Byrd et al. (1994); Kyambalesa (1994); Longenecker et al. (2000); and Peyton (2003) that identified the same activities as the main BSR focus small businesses are likely to engage in. The implication of the above for policy makers and small business owner managers is quite obvious. Firstly, the findings identify "affordable" BSR activities in the form of community, customer and employee related activities for small businesses new to BSR to engage in. In the same vein, policy makers, public and private BSR training providers and support agencies can focus their activities on these areas.

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Full Length Research Paper

The implications of Organizational Citizenship Behavior (OCB) towards the dimensions of Learning Organization (LO) in organizations in Southern Malaysia

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The main purpose of this study was to ascertain the implications of Organizational Citizenship Behavior (OCB) and towards the Learning Organization (LO) in the organizations at the southern region of Malaysia and also to find out which dimensions from the independent variables (OCB) influence LO the most. Learning Organization (LO) literally means that the organization experience continuous learning, where the effect of the learning can be seen, and they change suitable with the organization's environment. The 318 participants involved this study and were chosen from the seven organizations. The questionnaire was used and was distributed to the respondents in four sections, which consist of the demographic background, Learning Organization, and Organizational Citizenship Behaviour. The reliability of the instruments was tested by using alpha Cronbach range between 0.621 and 0.874. Findings from multiple regression analysis (stepwise) showed that only three dimensions of OCB which is altruism ($\beta = 0.261$), courtesy ($\beta = -0.182$) and civic virtual ($\beta = 0.167$) accounted for 8.7% of variation in criterion (learning organization) and altruism is the best predictor among OCB dimension. Research also presented a model designed to reflect the relationship between the dimensions of OCB and learning organization. These studies also imply that the level of OCB in increasing learning organization. Thus, the stability of the OCB will help to produce a competent generation and successful organization in line with the national privatization.

Key words: Altruism, sportsmanship, courtesy, conscientiousness, learning organization and civic virtue.

INTRODUCTION

In this globalization era, every organization must be able to cope with the changes that are occurring vastly, regardless if whether it is an international organization or even locals. This happens due to the increase of technology usage by the organizations in this world. An organization will be able to expand their business with technology by entering the world market. Hartmann (2000), changes is necessary to enhance marketing and strategies of an organization. In order to remain in this market, other organizations will also have to adopt and

adapt with these changes, worrying of the possibility where they will not be able to cope with the situation, they would lost their market share to those organization that are expanding globally and thus they would not be able to survive.

In addition, an organization would also have to either be forward of or at least in line with their competitors to survive. Due to this, they need to acquire and get the knowledge which is vital for them to be able to cope with the changes. This is why, being a learning organization is essential for organizations.

The rapid change that is happening nowadays is really a big challenge for the organizations to be able to sustain in the market, to keep on growing and also to remain

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competitive. More and more organizations have re-alized the importance of being a learning organization.

As for the organizations in Malaysia, being in a developing country makes it more vital for them to acquire and be a learning organization. This is to ensure that they are able to compete with the international organizations that are entering our local market. We must ensure that our organizations are able to grow and sustain in our market to increase our country's economy. In addition, once the organization is stable locally, they could enter the global market and thus gain more market share not only locally but also globally.

In order to achieve this, an organization must be a learning organization. This will help them by adopting and also adapting with the changes, and also making the successful organization as an example for them to keep improving to be in line or even better than the other organizations. This research will be able to help senior managements to determine whether Organizational Citizenship Behaviour and Organizational Commitment in their employees could support or facilitate their organization in achieving their target in being a learning organization.

This research will also be a very useful reference for employees to recognize the type of factors, characteristics, and the behaviours that an employer is expecting from their employees. Job seekers could also refer to this research in finding the right behaviour to apply or have in order to be employed by organizations.

Taking into example to prove this, is by interacting the two IVs to see whether they have do have a relationship in implementing the learning organizations in a specific organization.

In example, if an employee believes that being loyal to one organization is important (NC, OC), usually they will also be one of those employees who will have the attendance above the norm and will obey to the organization's rules and regulations (Conscientiousness, OCB). This is said possible because, this type consists of the people who embrace the organization's goal and policies because they feel it are their responsibility to move in line with their organization. On top of that, they will also willingly support the organization's goal by changing to improve their organization by being a learning organization.

Learning organization

Learning organization is defined as an organization that continuously learns in order to adapt with the rapid changes. It is also to enable the organizations to compete not only in the local market but also in the global market. An organization would be able to gain competitive advantage and will always be forward than their competitors, which are not learning organization. A learning organization is the organization that experience continuous learning, where the effect of the learning

can be seen, and they change suitable with the organization's environment. According to Peter Senge (1990), learning organization is an organization where people continually expand their capacity to create results they truly desire, where new and expensive patterns of thinking are nurtured, where collective aspirations is set free, and where people continually learning how to learn together. It shows here that learning organization does not only involve one party, but also the all employees in the organization as a whole.

It is impossible for an organization to be a learning organization without the involvement of the employees. They are the key players in ensuring that the organization is a learning organization. They are the ones who will have to continuously learn, adapt and cope with the rapid changes.

The level of being a learning organization depends on the employees in the organization. There are several factors or variables that can be used to determine the effect of the employee's involvements towards being a learning organization. In this study, there are two variables that are chosen to ascertain whether they do provide an impact on the effectiveness of learning organization. The variables mentioned are Organizational Citizenship Behaviour and also Organizational Commitment.

Organizational citizenship behaviour

The meaning of organizational citizenship behaviours Sangmook defined organizational citizenship behaviours (OCB) are viewed widely as contributing to an organization's overall effectiveness (Chermack, Lynham, van der, 2006). In addition, OCB refers to "those organizationally beneficial behaviors and gestures that can neither be enforced on the basis of formal role obligations nor elicited by contractual guarantee of recompense." In an organizational context, OCB is often part of an informal psychological contract in which the employee hopes that such extra effort may be perceived and then rewarded by the boss and the organization (Demers, 2009). The first variable is Organizational Citizenship Behaviour (OCB) which is, a discretionary behaviour that is not part of an employee's formal job requirement but that nevertheless promotes the effective functioning of the organization (Noordin et.al, 2010). This type of employees normally will do tasks that are more than what they are supposed to do. Furthermore, they do not ask for reward for doing all the extra tasks, yet will be happy enough seeing their organization succeed. There are five dimensions available under OCB, they are; 1) Altruism, 2) Civic Virtue, 3) Conscientiousness, 4) Courtesy, and 5) Sportsmanship. Each of these dimensions explains the different type of behaviours the employee have. Nevertheless, these dimensions enable the employee to work hard and care for their organization.

By acquiring OCB, the employee would definitely

perform positive attitudes and behaviours towards the organization. They would help the organization grow and build the organization image to the public. They will also take initiative to always improve themselves and as well as by helping others improve. In example, if the employee have this behaviour, by willingly giving off his time to help others out who have work related problems, it shows that the employees there are working as a learning organization where they '...continually learning how to learn together' (Senge, 1990).

The five dimensions of OCB are 1) Altruism, 2) Civic Virtue, 3) Conscientiousness, 4) Courtesy, and 5) Sportsmanship. *Altruism* implies that they give help to others. This happens when they help their colleagues who are facing with difficulties in their tasks. By doing this, they are implementing the 'continually learning how to learn together' which is the definition by Peter Senge (1990). Civic virtue is defined as subordinate participation in organization political life and supporting the administrative function of the organization (Basim, Sesen, Korkmazurek, 2007). It is referring to the responsibility of the subordinates to participate in the life of the firm such as attending meetings which are not required by the firm and keeping up with the changes in the organization (Organ, 1988). This dimension of OCB is actually derived from Graham's findings which stated that employees should have the responsibility to be a good citizen of the organization (Allen and Meyer, 1990). These behaviors reflect an employees' recognition of being part of organization and accept the responsibilities which entails (McGill, Slocum, Lei, 1992). Other researchers have found that civic virtue enhances the quantity of performance and help to reduce customer complaints (Somonin, 1997).

Civic Virtue suggests that employees responsible participate in the political life of the organization. In example, the employee attended meetings, trainings and other activities organized by his/her organization. By involving in these activities, the employees would be alert and updated with the latest information of the organization. They would also willingly attend trainings that could add value to their skills which directly supports one of the LO dimension which is, continuous learning. *Conscientiousness* means that employees carry out in role behaviours (that is, individual task performance) well beyond the minimum required levels. In example, when an employee's attendance is above the norm, they would definitely be able to perform above the average. This is made possible because they will be able to complete their tasks on time and get involved with many of the organization's activities. *Courtesy* means that they treat others with respect. When the employees in the organization treat each other with respect, they would be comfortable working with each other. In addition, it would make things easier for them to work in a team. This supports the dimension of LO which is team learning.

Sportsmanship indicates that people do not complain,

but have positive attitudes. In this case, when employee faces challenges in their work, they would not complain about it, but instead they will find ways to face the challenges and give their best towards solving it. By doing this, the employee are moving towards the definition of LO, 'an organization in which learning processes are... aligned with improvement and innovation goals' by Gephartm Marsick, VanBuren and Spiro (1996).

Purpose of the study

The study was conducted to investigate the relationship between the identified five dimensions of OCB, namely Altruism, Sportsmanship, Courtesy, conscientiousness and Civic Virtue to criterion learning organization as a whole. This study aims to identify whether the five dimensions of OCB have any contribution towards LO (Figure 1).

Research design

This study describes the relationship between Sportsmanship and learning organization. The study also looked in detail the relationship of each dimension OCB, where Altruism, sportsmanship, courtesy, civic virtue and conscientiousness and learning organization. This study was also conducted to determine the best predictors of learning organization. Based on the aforementioned statement, a model was developed to describe the relationship between five dimensions of OCB and learning organization. This model is built by showing whether the dimension of courtesy to work as a mediator to contribute to learning organization (Figure 2).

The definitions of each of the dimensions were shown in the Table 1, as adapted from Song, Joo, and Chermack (2009), from Watkins and Marsick's Model (1997).

For Continuous Learning, the learning comes from the employees through their participation in trainings, through communications with others, through observations from their peers and etc. The organization will encourage the organization to learn. Inquiry and Dialogue happens when the organization encourage the employees to acquire knowledge from many perspectives, which includes from questioning, sharing and accepting ideas of others in the organization. The Team Learning encourages a shared thinking between all the employee in the organization. They collaborate the different ideas they have and generate it as one which suits the organization as a whole. The Embedded System shows that all parts (departments) in an organization are interrelated and connecting of one another. In order for the organization to function efficiently, all parts (departments) must work together to support each another. All of the employees, professionals and departments need to work together in

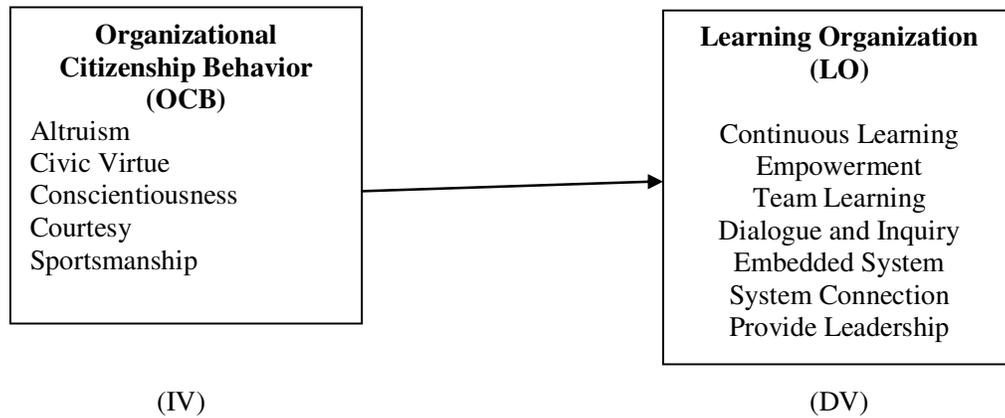


Figure 1. The factors influencing learning organization.

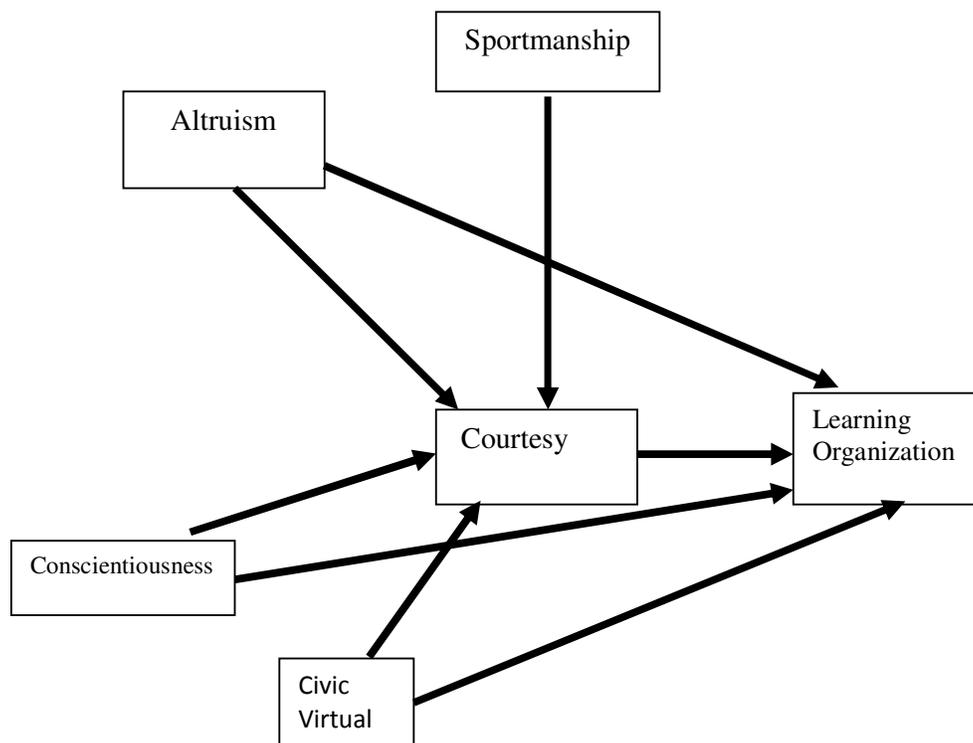


Figure 2. Model relationship between dimensions of altruism, sportsmanship, courtesy, civic virtue and conscientiousness skills on learning organization.

order to achieve improvements because there will be continuous learning involved throughout the whole process. System Connection is the direct change of the environment. It helps the community (environment) to know the importance of their work to the organization and how they help the organization to achieve their goals. Leadership is one of the components in an organization. Leaders lead the organization through visions. Strategic Leadership helps to encourage employees in an organization to work efficient and effectively in achieving the

organization's visions.

Organizational citizenship behavior

Organizational Citizenship Behavior (OCB) first three types of behaviour introduced by Katz and Kahn (1966) required of employees for the functioning of the organization are the decision to join and remain in the organization, the performance of a prescribed role in a dependable manner, and the undertaking of the

Table 1. Watkins and Marsick's Model (1997) of the seven dimensions of the learning organization. Adapted by from Song, Joo, and Chermack (2009).

Dimension	Description
Continuous learning	Opportunities for ongoing and growth are provided; learning is designed into work so that people can learn on the job.
Inquiry and dialogue	The organizational culture supports questioning, feedback, and experimentation; people gain productive reasoning skills to express their views and the capacity to listen and inquire into the views of others.
Team Learning	Work is designed to use teams and access different modes of thinking; collaboration is valued by the culture and rewarded; teams are expected to learn by working together.
Embedded system	Necessary systems to share learning are created, maintained, and integrated with work; employees have access to these high- and low-technology systems.
Empowerment	People are involved in setting and implementing a shared vision; responsibility is distributed so that people are motivated to learn what they are held accountable to do.
System connection	The organization is linked to its communities; people understand the overall environment and use information to adjust work practices; people are helped to see the effect of their work on the entire organization.
Provide leadership	Leadership uses learning strategically for business results; leaders model, champion, and support learning.

innovative and spontaneous activities beyond the prescribed role requirement.

Bateman and Organ, 1983; Smith et al., 1983 term OCB as the extra-role behaviour. The definition was mainly about the extra effort taken by employees at the workplace which are not mentioned in their job description but helps to enhance the organization as a whole.

Another definition of OCB is, "... OCB represents individual behaviour that is discretionary, not directly or explicitly recognized by the formal reward system, and in the aggregate promotes the efficient and effective functioning of the organization" (Organ, 1988, p.4)

Robbins (2001) defines OCB as a discretionary behaviour that is not part of an employee's formal job requirement but that nevertheless promotes the effective functioning of the organization. It means here that the employees tend to perform tasks which are not required but would help the organization's functioning.

According to Turnipseed and Rassuli (2005), OCB elements which enhance performance include: elements which add social capital, helping or altruistic elements, elements resulting with time savings or problem solving, and other elements which provide socio-emotional

support by boosting morale or developing a nurturing culture. Walz and Niehoff (1996) argue that only the helping-type of citizenship behavior element of OCB is linked to performance, while Karambayya (1990) suggests that more OCB elements are found in high-performing workgroups compared to low-performing workgroups.

Examples of employee OCB include: accepting extra responsibilities and duties at work, working overtime when needed, and helping subordinates with their work (Masterson, Lewis, Goldman and Taylor, 1996; Organ, 1988). Subordinates with high level of OCB are more likely to be committed to the organization (William and Anderson, 1991; Smith, Organ and Near, 1983).

As a whole, based from the mentioned definitions by the previous scholars above, OCB can be concluded or defined as, the extra behaviours taken by the employee which are not in the job description requirements but performed under their own independent effort, which as a result, helps to improve and enhance the effectiveness and the efficiency of the organization's functioning.

The OCB model which was introduced by Organ (1988) consists of five distinctive dimensions. They are; altruism, sportsmanship, conscientiousness, courtesy and civic

Table 2. Population and number of respondent.

Organization	Population	No. of respondents
Malaysian Biotechnology Corporation (BiotechCorp) Sdn Bhd	130	15
PJBumi Bhd	60	50
Malaysian Ministry of Education	150	100
CTRM Aerocomposite Sdn Bhd	250	107
Berjaya Sampo Sdn Bhd	350	20
Maritime Resources Management (MRM) Holdings Sdn Bhd	150	16
Century Independent Loss Adjusters Sdn Bhd	50	10
Total	1,140	318

virtue.

Altruism is helping colleagues in performing their tasks (Castro, Armario, Ruiz).

Sportsmanship defined as the employees' goodwill in tolerating less than ideal circumstances without "complaining... and making a federal case out of a potato" (Organ, 1988, p.11).

Conscientiousness is behavior that goes beyond the requirements established by the organization.

Courtesy is behavior that helps organizational members prevent problems from occurring and also treating others with respect.

Civic virtue is a behavior that shows a concern for participating in corporate life or behaviors that engage in the political process of the organization.

METHODOLOGY

Participants

The participants of this study consist of the employees from the seven organizations which are involved in this study. The seven organizations are Malaysian Biotechnology Corporation (BiotechCorp) Sdn Bhd, PJBumi Bhd, Malaysian Ministry of Education, CTRM Aero Composites Sdn Bhd, Berjaya Sampo Insurance Bhd, Maritime Resources Management (MRM) Holdings Sdn Bhd, Century Independent Loss Adjusters Sdn Bhd. The numbers of respondents involved in this study are as listed in Table 2.

Sampling

Sampling is the process of selecting a sufficient number of elements from the population, so that a study of the sample and an understanding of its properties or characteristics would make it possible for us to generalize the characteristics to the population elements. Nachmlas (1981) explains that the main aim of sampling is to make inference about a certain parameter (specified value) that is unknown from sample statistics that can be measured. Sampling frame is the listing of all the elements in the population from which the sample is drawn. In this study, the sampling frame is 1,140 employees which includes of the elements which consists of the employees with the positions of executives and above in the seven organizations involved. Sampling size is important to establish the representativeness of the sample to generalize the results of the study. According to the Sample Size for a Given Population Size table in Sekaran (2007), if the total number of

elements in the population (N) is 1,100, the sample size to be estimated (S) is 285.

In this study as been discussed above, $N = 1,140$. The sample size, or $S = 318$.

The researcher purposely added more respondents as the sample size to ensure accuracy of results.

Data collection method

Data can be obtained from two sources, that is, primary and the secondary sources.

The primary sources are the data collected firsthand for subsequent analysis to find solutions to the problem researched. Meanwhile, secondary data are the data that have already been gathered by researches, data published in statistical and other journals, and information available from any published or unpublished source available either within or outside the organization, which might be useful to the researcher.

Data collection methods are an important part of research design. There are several data collection methods, each with its own advantage and disadvantages. Problems researched by using the appropriate methods will enhance the value of the research.

Measurement

The questionnaire that is being used in this study is a secondary data source where it has been adapted from the questionnaire which has been proposed and developed by Watkins and Marsick in 1997.

Section A

In this section, respondents are required to answer questions regarding their background including, gender, age, race, marital status, educational level, position in organization, length of service in their organization, the industry they are working in. These questions are asked to get to know of the respondents that are involved in this study better.

Section B

This study is mainly about Learning Organization. As the Dependent Variable, the questions in this section study the seven dimensions of Learning Organization. It includes the questions of Continuous Learning, Empowerment, Team Learning, Dialogue and Inquiry, Embedded System, System Connection, and Provide Leadership.

Table 3. Reliability test using Cronbach alpha.

Learning organization	Cronbach alpha
Continuous Learning	0.705
Empowerment	0.683
Team Learning	0.732
Dialogue and Inquiry	0.752
Embedded System	0.621
System Connection	0.864
Provide Leadership	0.874
Organizational citizenship behavior	
Altruism	0.667
Sportsmanship	0.657
Courtesy	0.631
Civic Virtual	0.804
Conscientiousness	0.741

This section enables the researcher to be familiar with the organization involved and to know whether they support learning organization or not.

Section C

The questions on Organizational Citizenship Behavior evaluate the employees' behavior within the organization. The questions are about Altruism, Sportsmanship, Courtesy, Civic Virtue, and Conscientiousness.

It is mainly used by the researcher to know the behavior of the respondents as employee in an organization either on how the support the organizational goals, obey to the rules, relationship with their peers and etc. It is also to determine the employee's sense of belonging with the organization.

In this section C, the question number 1, 12, 13 14, and 19 are the questions on Altruism. Question 2, 3, and 18 are the Sportsmanship questions, while 4 and 5 are the questions on Courtesy. Question number 6, 7, 8, 9, 10 and 11 are the Civic Virtue questions and question 15, 16, and 17 are the questions on Conscientiousness.

Reliability test

This test provides the reliability result to each of the questions. The results will be from '0.10' until '1.00'. If the result is below '0.50' the variable or question is deemed to be unreliable and should not be included in the questionnaire. If the question gets the result of '0.50' until '0.69', the question is considered to be weak, but can still be inserted in the questionnaire. The question is most reliable when the result is '0.70' and above.

According to Basim, Sesen, Korkmazurek (2007) the result of the reliability should reached 0.65 and above to ensure that the instrument is suitable to be used in the study. The result of the pilot test is given in Table 3.

RESULTS

Pearson correlation

In a research study, despite of knowing the means and

standard deviations of the dependent and the independent variables, we would like to show one variable is related with another variable. It means, we would like to see the nature, direction, and significance of the *bivariate* relationships of the variables in the study. A Pearson correlation matrix will provide this information, where it will indicate the direction, strength, and significance of the bivariate relationships of all the variables in the study.

Table 4 shows that the dimensions of OCB that are Courtesy ($r=0.406$, $P<0.05$), Sportsmanship ($r=0.196$, $P<0.05$), Civic Virtue ($r=0.162$, $P<0.05$), Conscientiousness ($r=0.117$, $P<P.005$), have significant relationship with Continuous Learning. However, Altruism ($r=0.056$, $P>0.05$) has no significant relationship with Continuous Learning.

The four dimensions of OCB, Courtesy ($r=0.311$, $P<0.000$), Altruism ($r=0.167$, $P<0.05$), Sportsmanship ($r=0.152$, $P<0.05$), and Civic Virtue ($r=0.125$, $P<0.026$) is found to be having significant correlation with Empowerment, while only one of the dimensions of OCB has no significant correlation, which is Conscientiousness ($r=0.036$, $P>0.05$).

In OCB, four dimensions, Altruism ($r=0.383$, $P>0.05$), Courtesy ($r=0.247$, $P<0.05$), Civic Virtue ($r=0.169$, $P<0.05$), and Sportsmanship ($r=0.330$, $P>0.05$) have significant correlation with Team Learning and only two of the dimensions, and conscientiousness ($r=0.059$, $P>0.05$) have no significant correlation. All the dimensions of OCB, Sportsmanship ($r=0.484$, $P<0.05$), Courtesy ($r=0.474$, $P<0.05$), Civic Virtue ($r=0.423$, $P<0.05$), Altruism ($r=0.270$, $P<0.05$) and Conscientiousness ($r=0.266$, $P<0.05$) have significant relationship with Dialogue and Inquiry.

Three of the dimensions of OCB, Courtesy ($r=0.306$, $P<0.05$), Sportsmanship ($r=0.241$, $P<0.05$), and Civic Virtue ($r=0.221$, $P<0.05$) have significance correlation with embedded system. Only two of the dimensions

Table 4. Relationship between the dimensions of learning organization and organizational citizenship behaviour.

Variance	Continuous learning	Empowerment	Team learning	Dialogue and inquiry	System connection	Embedded	Pilot leadership
Altruism	0.056	0.167**	0.383**	0.270**	0.143**	0.108	0.247**
Sportsmanship	0.196**	0.0152**	0.330**	0.484**	0.385**	0.241**	0.479**
Courtesy	0.406**	0.311**	0.247**	0.474**	0.485**	0.306**	0.444**
Civic Virtue	0.162**	0.125*	0.169**	0.423**	0.298**	0.221**	0.308**
Conscientiousness	0.117**	0.036	0.059	0.266**	0.114**	0.084	0.015

*Correlation is significant at the 0.05 level (2-tailed).

which are Altruism ($r=0.108$, $P>0.05$) and. Conscientiousness ($r=0.084$, $P>0.05$) are not related with Embedded System

Table 4 shows that all the dimensions of OCB, that are Courtesy ($r=0.485$, $P<0.05$), Sportsmanship ($r=0.385$, $P<0.05$), Civic Virtue ($r=0.298$, $P<0.05$), Altruism ($r=0.143$, $P<0.05$) and Conscientiousness ($r=0.114$, $P<0.05$) have significant relationship with System Connection,

Four dimensions of OCB, which are Sportsmanship ($r=0.479$, $P<0.05$), Courtesy ($r=0.444$, $P<0.05$), Civic Virtue ($r=0.308$, $P<0.05$) and Altruism ($r=0.247$, $P<0.05$) are significant with Provide Leadership, while only one of the dimensions which is Conscientiousness ($r=0.015$, $P>0.05$) has no relationship with Provide Leadership.

Linear regression

The correlation coefficient r indicates the strength of relationship between two variables, it gives no clue of how much of the variance in the dependent or criterion variable will be explained when several independent variables are theorized to *simultaneously* influence it.

Regression analysis involving the five predictors (Altruism, Sportsmanship, Courtesy, Civic Virtue, and Conscientiousness), while the dependent variables continuous learning (criterion) for all five independent variables. Table 6 shows the results of multiple regressions (stepwise). From the analysis carried out there was a significant variance of the factor dimensions (Altruism, Sportsmanship, Courtesy, and Civic Virtue) to criterion learning organization.

When several variables are jointly regressed against the dependent variable in order to explain the variance in it, the individual correlation collapse into a *multiple r*, with what is known as multiple regression analysis.

Table 5 shows the results of the correlation between the dependent variable (altruism, sportmanship, courtesy, civic virtue and Conscientiousness) and independent variables (learning organization). Results can be viewed through three variations of the analysis (ANOVA) shows significant contributions. (altruism, $r=0.210$, $p<0.05$), sportmanship, 0.211 , $p<0.05$) and civic virtue, $r=0.210$ $p<0.05$).

There is a significant contribution of altruism and learning organization, $F(1,368) = 16,958$, $p < 0.05$ where $p = 0.000$. For sportmanship and learning organization is significantly contribute $F(2,367) = 12,193$, $p < 0.05$ where $p = 0.000$. And there is a significant contribution of civic virtue with learning organization $F(3,366) = 11,564$, $p < 0.05$ where $p = 0.000$. While the emotion and Conscientiousness do not have a significant contribution to learning organization.

Based on Table 6, the analysis of R^2 for model 1 (altruism) is 0.044. The smaller the R^2 , the less capable independent variables (altruism) to explain the dependent variable (learning organization), $F(1,368) = 16,958$, $P = 0.000 < 0.05$. When viewed on the Beta, dimensions of altruism (beta = 0.210, $t = 4.118$, Sig = 0.000 and $R^2 = 0.044$). This means that the proposed model fit the data in the percentage of only 4.4%. The conclusion is also supported by analysis of variance is significant that the value of 0000 is significantly lower than the specified significant level of 0.05. This finding means that the first predictor of altruism shown by the first model accounted for 4.4% increase in change criterion (learning organization).

Value analysis of R^2 for model 2 (civic virtue) is 0.062. The smaller the R^2 , the less capable independent variable (civic virtue) to explain the dependent variable (learning organization), $F(2,367) = 12,193$, $P = 0.000 < 0.05$. When viewed on the Beta, civic virtue dimension (beta = -0.169, $t = -2.673$, Sig = 0.008 and $R^2 = 0.062$). This means that the proposed model fit the data in the percentage is only 6.2% only. The conclusion is also supported by analysis of variance is significant that the value of 0.000 is significantly lower than the specified significant level of 0.05. This finding means that the second predictor of civic virtue demonstrated by the two models accounted for 6.2% of additional changes in criterion (learning organization).

Through the analysis of R^2 for model 3 (civic virtue) is 0.087. The smaller the R^2 , the less capable independent variables (civic virtue) to explain the dependent variable (learning organization), $F(3,366) = 11,564$, $P = 0.000 < 0.05$. When viewed on the Beta, the dimensions of civic virtue (Beta = 0.167, $t = 3.119$, Sig = 0.002 and $R^2 = 0.087$). This means that the proposed model fit the data in the percentage is only 8.7% only. The conclusion is

Table 5. Result of matrix correlation between OCB dimension and with learning organization.

Variable	M (SD)	AL	SM	CT	CV	CS	LO
AL	3.47 (0.449)	1.0					
SM	3.54 (0.436)	.834	1.0				
CT	3.38 (0.445)	.599*	.599*	1.0			
CV	3.40 (0.310)	.348*	.382*	.261*	1.0		
CS	3.36 (0.401)	.336*	.349*	.262*	.128	1.0	
LO	3.66 (0.902)	.210*	.211*	.017	.210*	.042	1.0

Note : AL = altruism, SM = Sportmanship, CT = courtesy, CV = Civic virtue, CS = Conscientiousness, LO = Learning organization
*p < .05, **p < .01

Table 6. Regression analysis results for dimensions of altruism contributions, courtesy and civic virtue with the learning organization.

Model	R	R ²	Adj. R ²	Std. error of the estimate	Change statistics				
					ΔR ²	ΔF	df 1	df 2	Sig. ΔF
1	.210 ^a	.044	.041	.88307	.044	16.958	1	368	.000
2	.250 ^b	.062	.057	.87579	.018	7.145	1	367	.008
3	.294 ^c	.087	.079	.86556	.024	9.726	1	366	.002

a. Predictors: (Constant), altruism. b. Predictors: (Constant), altruism, courtesy. c. Predictors: (Constant), altruism, courtesy, civic virtue. d. Dependent variable: Learning organization

also supported by analysis of variance is significant that the value of 0000 is significantly lower than the specified significant level of 0.05. This finding means that the third predictor of civic virtue shown by the three models accounted for 8.7% increase in change criterion (learning organization).

Based on the value of R² for all three models can be concluded that this finding indicates that 4.4% dimensional altruism contributes to learning organization, the percentage increase rose to 6.2% when contributions to dimensions of civic virtue are taken into account and further to 8.7% if the dimensions of civic virtue are into account the change in academic performance.

The results of the analysis also allow researchers to get a regression equation that can be used to predict the Y value in the future. The regression analysis results obtained as follows:

$$Y = \beta_0 + \beta_1X + \beta_2X^2 + \beta_3X^3 + \beta_4X^4 + \text{Constant standard error}$$

$$Y = 1.438 + 0.21X - 0.169 X^2 + 0.167X^3 + 0.549$$

Y = Learning organization

$\beta_1X = 0.21$ (altruism)

$\beta_2X^2 = -0.169$ (courtesy)

$\beta_3X^3 = 0.167$ (Civic virtue)

(Constant standard error) = 0.549

(Constant) = 1.438

From the analysis based on Table 7, it appears that there

is a significant variance for the dimensions (altruism, civic virtue and civic virtue) to criterion learning organization, F = 16,958, Sig = 0.000 < 0.05 (altruism), F = 12,193, Sig = 0.000 < 0.05 (civic virtue) and F = 11,564, Sig = 0.000 < 0.05 (courtesy). When viewed on the Beta, dimensions of consciousness (beta = 0.21, t = 4.118, Sig = 0.000 and R² = 0.044), civic virtue dimension (beta = -0.169, t = -2.673, Sig = 0.008 and R² = 0.062) and dimensions of courtesy (Beta = 0.167, t = 3.119, Sig = 0.002 and R² = 0.087).

The conclusion of that regression results,

1. When the dimensions of altruism increases per unit, then the scores of learning organization will increase by 4.4%.
2. When the dimensions of courtesy to increase the unit, then the scores of learning organization will increase by 6.2%.
3. When the dimensions of civic virtue increase per unit, then the scores of learning organization will increase by 8.7%.

It can be concluded that these findings show that 4.4% dimensional altruism contributes to learning organization, the percentage increase rose to 6.2% when contributions to take into account the dimension of courtesy and increasing to 8.7 % if the dimensions of civic virtue is taken into account the change in learning organization.

Path analysis

Regression analysis (stepwise) involves five predictors

Table 7. Regression analysis results for altruism contributions, courtesy and civic virtue with employees learning organization.

Variabel	Multiple R	β	Standard error <i>b</i>	Beta	<i>t</i>	Significance of <i>t</i>
Altruism	0.21	0.524	0.129	0.261	4.054	0.000
Courtesy	0.25	-0.369	0.127	0.182	-2.915	0.004
Civic virtue	0.294	0.485	0.156	0.167	3.119	0.002

Table 8. Regression analysis results for altruism and contributions civic virtue by courtesy.

Variabel	Multiple R	β	Standard error <i>b</i>	Beta	<i>t</i>	Significance of <i>t</i>
Altruism	0.599	0.594	0.041	0.599	14.344	0.000
Courtesy (Excluded variables)	-	0.059	-	0.070	1.335	0.183

Table 9. Regression analysis results for altruism with civic virtue.

Variabel	Multiple R	β	Standard error <i>b</i>	Beta	<i>t</i>	Significance of <i>t</i>
Altruism	0.348	0.240	0.034	0.348	7.122	0.000

(altruism, courtesy, civic virtue and Conscientiousness), while learning organization is as (criterion) on these five variables as given in Tables 7, 8 and 9. Figure 3 shows the results of multiple regressions (stepwise). From the analysis carried out found that there is a significant variance for the dimensions of altruism, courtesy and civic virtue to employees' learning organization (criterion) and result also shows that altruism is a good predictor ($B = 0.261$) compare to Courtesy ($B = 0.182$) and civic virtue ($B = 0.167$) toward learning organization.

DISCUSSION

The main purpose of this study was to ascertain the implications of Organizational Citizenship Behavior (OCB) towards the dimensions of Learning Organization (LO) in the organizations at the southern region of Malaysia and also to find out which dimensions from the two independent variables above influence LO the most. At the same time also see the dimensions of dominance and to contribute to learning organization. From the findings, found only dimension of Altruism, courtesy and Civic Virtue showed only a significant relationship as a predictor of learning organization. Although the contribution of small value where the R^2 of Altruism = 4.4%, R^2 increased to 6.2% by taking into account the dimension of courtesy and R^2 continues to increase up to 8.7% when civic virtue is taken into account, but to prove their role in determining the success of a person in the organization.

This was further proved by Garvin (2000), in which the study showed Civic Virtue dimension has significant contribution to learning organization.

This view is also supported by Noe Raymond (2008) which states that higher capacity in Civic Virtue towards achieving good learning organization. Those who have Civic Virtue are sensitive to the work environment and can adapt to the environment, such as happy, friendly, angry, sad or sick heart. The personal will be better liked by their college and create a conducive environment to face learning, which indirectly increased learning organization (Cross, 1974).

Similarly, the dimensions of courtesy to show a strong significant on learning organization. The findings are consistent with studies McAlister (1991), where he also agreed that any goal-oriented to obtain good results. Noe, Raymond, A (2008).also succeeded in proving courtesy in a person who will bring a positive impact especially good learning organization. Employees who have courtesy and urge to successd are more confident in taking action (Watkins and Marsick, 1997). This finding also supports the study of (Cross, 1974) which stated that any person who is able to recognize himselfand feels more successful in their careers. Courtesy is a behaviour that helps organizational members prevents problems from occurring and treating others with respect. Continuous Learning is where the opportunities for ongoing and growth are provided; learning is designed into work so that people can learn on the job (Watkins and Marsick, 1997).

It shows that that, by continuously learning and

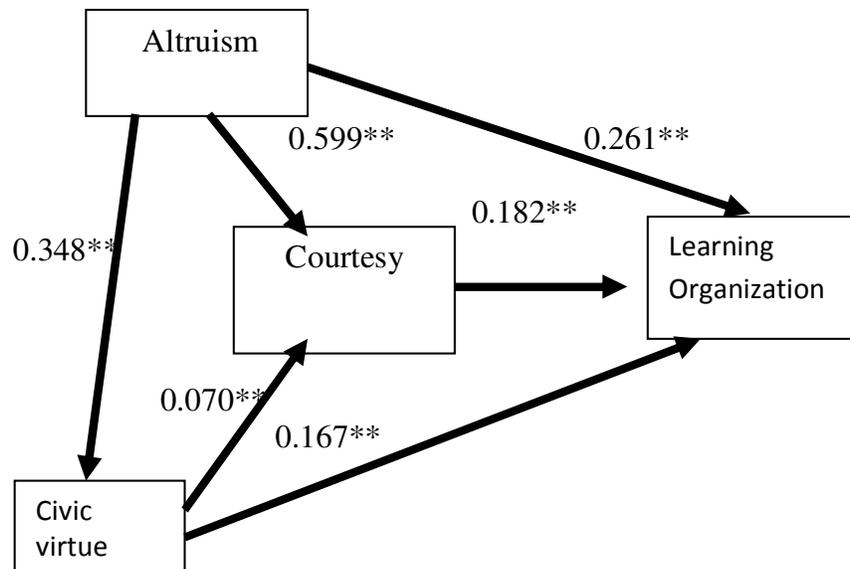


Figure 3. Model predictor dimensions of altruism, courtesy and civic virtue on learning organization.

expanding their knowledge, employees will be able to help their colleagues in preventing problems from occurring. They could use the knowledge and experiences they have and work together in prevent the problems. Continuous learning is made easy when the members of the organization are able to work together, and help each other when they have respect for one another. When they respect each other, they will be open hearted to share information, knowledge and ideas when doing their work.

Senge (1990: 3) stated that organizations where people continually expand their capacity to create the results they truly desire, where new and expensive patterns of thinking are nurtured, where collective aspiration is set free, and whether people are continually learning to see the whole together. Learning organization embraces a culture of lifelong learning, enabling all employees to continually acquire and share knowledge (A. Noe, Raymond, 2008). Thus LO as an organization which encourages continuous learning and where the employees share knowledge in order to create a new thinking and enables them to work together? It shows that courtesy is very important in organizations since respecting and helping one another enable them to work together.

Courtesy means helping other members in preventing problems and also respecting each other. Empowerment is where people are involved in setting and implementing a shared vision; responsibility is distributed so that people are motivated to learn what they are held accountable to do from this study, it shows that when people respect one another, empowerment can be done. Superiors will have to have respect and trust their subordinates in order to delegate work. By doing this, their subordinates will be more motivated because they were given responsibilities and trust by their superiors in performing a task (Watkins

and Marsick, 1997).

According to Garvin (2000), a learning organization is an organization skilled at creating, acquiring and transferring knowledge; and at modifying its behaviour to reflect new knowledge and insights. According to Gephart, Marsick, VanBuren and Spiro, (1996, p.40), a learning organization is an organization in which learning processes are analyzed, monitored, developed, managed and aligned with improvement and innovation goals.

Empowerment and Courtesy supports the above definitions of LO where employees will have to create, acquire new knowledge when getting a new task, and where the superiors will transfer their knowledge to the subordinates. From empowerment, new knowledge will occur where the employee with different sets of skills and experience performs the task with the additional knowledge transferred from their superiors. Empowerment is also a learning process in organization where the subordinates will be able to learn while being monitored by their superiors. This enables the organization to improve themselves with new ideas, skills, experience and knowledge.

Courtesy is the behaviour of employees which helps their colleagues in preventing problems from occurring and also where the employees treating others with respect. Affective Commitment is the positive feelings of identification with and involves the work organization (WeiBo, Kaur and Jun, 2009). Team Learning is where work is designed to use teams and access different modes of thinking; collaboration is valued by the culture and rewarded; teams are expected to learn by working together (Watkins and Marsick, 1997).

Team Learning can be made possible when the team members (employees) treat each other with respect. With

respect, they will be able to collaborate and exchange and share their thinking in order to create a new shared thinking which will enable the organization to obtain a new knowledge. When an employee feels the attachment and is comfortable with the organization, they would commit with the organization's strategies and etc, in this point of view is the Team Learning. They might feel happy working with their colleagues, and thus, they work together as team perfectly.

Senge (1990: 3), stated that 'organizations where people continually expand their capacity to create the results they truly desire, where new and expensive patterns of thinking are nurtured, where collective aspiration is set free, and whether people are continually learning to see the whole together'.

From the above definition, it shows that Team Learning, Courtesy and Affective Commitment supports LO where the employees continually expand their capacity to create results they truly desire by working with other peers and where they will gain new knowledge. They are working towards learning to see the whole together.

Sportsmanship defined as employees' goodwill in tolerating less than ideal circumstances without "complaining and making a federal case out of a potato" (Organ, 1988, p.11). Courtesy is behavior that helps organizational members prevent problems from occurring and also treating others with respect. Conscientiousness is behavior that goes beyond the requirements established by the organization. Dialogue and Inquiry are the situation where the organizational culture supports questioning, feedback, and experimentation; people gain productive reasoning skills to express their views and the capacity to listen and inquire into the views of others (Watkins and Marsick, 1997).

Sportsmanship supports Dialogue and Inquiry by not complaining if they are faced with problems, but will ask for ideas in order to solve the problems. Courtesy or treating others with respect allows the employee to help their colleagues who are facing problems and gives feedback when questions are given. People with conscientiousness behaviour will be continuous learn by asking questions in order to gain new knowledge even though the questions are not related with their work. According to Garvin (2000), learning organization is an organization skilled at creating, acquiring and transferring knowledge; and at modifying its behavior to reflect new knowledge and insights.

Sportsmanship, courtesy and conscientiousness in dialogue and inquiry helps the employees in creating, acquiring and transferring knowledge through questioning, feedback, and experimentation. The employees gain productive reasoning skills to express their views and the capacity to listen and inquire into the views of others. This helps them to modify their behavior to reflect new knowledge.

Civic Virtue is a behavior that shows a concern for participating in corporate life or behaviors that engage in the

political process of the organization. Embedded Systems is where necessary systems to share learning are created, maintained, and integrated with work; employees have access to these high- and low-technology systems.

Courtesy and Civic Virtue influence Embedded Systems by the employees helps their colleagues in preventing problems from occurring by using the systems provided by the organization. The employees can also help by participating maintaining the systems. According to Marsick (in Song, Joo, Chermack, 2007, p. 8) a learning organization is "one that learns continuously and transforms itself... Learning is a continuous, strategically used process – integrated with and running parallel to work... Learning also enhanced organizational capacity for innovation and growth. The learning organization has embedded systems to capture and share learning"

Here, with the Courtesy and Civic Virtue behaviors that the employees in the organization have, it supports the definition of Learning Organization as defined by Marsick above. They use systems in their process to continuously learn.

Courtesy is the behavior where an employee helps colleagues to prevent problems from occurring and treating others with respect. Sportsmanship is where an employee tries to solve their problems first before seeking help from others. They don't complain on petty matters. System Connections is the organization is linked to its communities; people understand the overall environment and use information to adjust work practices; people are helped to see the effect of their work on the entire organization.

Courtesy influence System Connection by respecting each other and help prevent problem from occurring and each departments to support and helps each other. System Connection is influenced by Sportsmanship where the employees align their work with others in order to achieve the same goals. System Connections influenced by Courtesy and Sportsmanship supports the above mentioned definition of LO by, continually learning to see the whole together.

Sportsmanship is a behavior where the employee seeks for solution themselves before asking for other people's help. Courtesy is where the employee helps others to prevent problems from occurring and they respect others. Provide or Strategic Leadership means leadership uses learning strategically for business results; leaders model, champion and support learning.

Sportsmanship influence Provide Leadership by supporting learning in ways that they gain new knowledge through finding solutions themselves through experiences. Providing Leadership is influenced by Courtesy where leaders and employees treat each other with respect and where leaders help employees in preventing problems from occurring.

Gephart, Marsick, VanBuren and Spiro, (1996, p.40), describes a learning organization as an organization in which learning processes are analyzed, monitored,

developed, managed and aligned with improvement and innovation goals.

The aforesaid definition is true where leaders in an organization monitor and develop the learning process to their subordinates in order to ensure that continuous learning is practised in their organization.

In the study, multiple regression was used to examine the impact of OCB towards learning organization, and we confirm all of them. First, there are sufficient evidence to prove that organizational learning can be influenced positively by organizational citizenship behaviors. If the employees have higher willingness to organizational citizenship behaviors or organizational commitments, and the company can have higher quality of organizational learning (Kreitner, Kinicki, 2004). These results lead to the conclusion that when the manager of an organization provides their staff with high OCB, as well as the higher quality of organizational commitments results in the employees' organizational citizenship behaviors very well (Tsang, 1997).

The anterior researches reveal that the organizational citizenship behaviors is related to organizational learning (Hellriegel, Slocum, 2004) and the relationship exist between organizational commitments and organizational learning (Heneman, Judge, 2003). Compared with the previous research, this study has verified that organizational citizenship behaviors can positively influence organizational learning (Smith, 2001).

The research area is the organizational members' organizational citizenship behaviors and organizational commitments in the workplace. The limitations of the present research are the hidden reasons of organizational citizenship behaviors. To sum up, organizational citizenship behaviours and organizational learning are the fairly critical elements to managers and employees of an organization (Jyothibabu, Farooq, Pradhan, 2010). Thus, the different viewpoints between managers and employees to the organizational citizenship behaviors, moreover, organizational commitments and organizational learning can be measured in future studies (Starbuck, Holloway, 2008).

Conclusion

One important factor in determining the success of learning is to give full attention and concentration during the process of working. Attention and focus is to help employees develop cognitive intelligence and make it easier to remember facts or information communicated (Cross, 1974). It is here that the high level of organizational citizen behavior can help calm the mind and thus to increase the absorption of information received. Thus, it will contribute to the achievement of learning organization.

Outstanding learning organization is the key targets and goals for each employee regardless of ethnic group. In order to obtain good results, apart from learning the

techniques of effective and well planned, employees should be able to recognize themselves in particular in terms of self emotional so that it does not become a stumbling block to success. Hence the need to identify themselves, organizational citizen behaviour should be noted not only for academic interest but also of future success in life. Efforts to increase employees' organizational citizen behavior should be considered during the process of understanding the need of learning organization with the aim of building a resilient and capable human face of globalization and changing demands.

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Full Length Research Paper

Core competence: From a strategic human resource management perspective

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Core competence has become the prevailing term in strategic management (SM) and human resource management (HRM) literature. However, the exact meaning of the “core” term has been ambiguous to researchers, educators, and practitioners. This article addresses the interpretations of “core” in SM and HRM literature and adopts the Strategic Human Resource Management (SHRM) perspective to redefine core competence and human competence as organizational and individual capabilities that create organizational competitive advantage. We build a conceptual framework to show the relationship between core competence and human competence, and provide business and management implications.

Key words: Core competence, human competence, competitive advantage.

INTRODUCTION

Core competence has become a popular term in business discipline, however, the meaning of the “core” term is still unclear because it is loosely used in a variety of ways (Lahti, 1999). For example, strategic management (SM) scholars apply “core competence” to the organizational capabilities of a firm for competitive advantage, while Human Resource Management (HRM) scholars refer to “core competence” as human capabilities related to superior job performance. Therefore, the meaning of core competence remains ambiguous and confusing.

Unclear understandings of core competence have confused business researchers, practitioners, and educators, and have the potential to obstruct future research. The SM rendering of “core” represents “firm-specific” attributes in contrast to “generic” attributes by HRM. However,

in practice, the fallacy that “firm-specific” competitive advantage derives from “generic” competence exists. Several cases have encountered the controversy between perspective and approach (for example, analyzing core competence in adopting the SM perspective, but conducting a HRM approach). For example, Clardy (2008) questioned the effectiveness of traditional competence assessment techniques on organizational performance, which conducts a bottom-up approach to investigate a generic or universal set of behavioral characteristics in a job family across organizations. Such generic competences contribute to less than fifty percent of managerial effectiveness (Hamlin, 1990). These generic human characteristics provide less uniqueness for firms and can be appropriated and used by other firms (Clardy, 2008).

However, the SM and HRM perspectives on core competence are not exclusive. strategic human resource management (SHRM) synthesized the SM and HRM perspectives and redefined “core competence” and “human

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competence” as macro- and micro-level capabilities that collectively define competitive advantage for firms. Based on the SHRM perspective, this article argues that core competence and human competence are complementary in the way that core competence strategically directs human competence, which makes core competence “whole.” This article begins by reviewing the concept of core competence in SM and HRM literature, analyzes the meaning of “core” competence in the aspects of benefits, approaches, and attributes. We propose a SHRM conceptual framework showing the interplay of core competence, human competence, organizational context, and competitive advantage. Finally, we suggest theoretical and business education implications.

LITERATURE REVIEW

Core competence from the strategic management perspective

During the 1980s and 1990s, firms increasingly confronted novel and unexpected external pressure and internal challenge (Drejer, 2002). To compete in flexible and prompt response and concentrate on customer demand, firms adopted the market-positioning approach of strategic management (Porter, 1980), which argues that sustained competitive advantage of firms derives from the product, production, and marketing posture relative to its competitors (Clardy, 2008). Strategic business units (SBUs), which focus on decentralization and independent management, were perceived as an effective program (Unland and Kleiner, 1996). However, an entirely “new competitive landscape” arose in the 1990s, in which technology rapidly altered the nature of competition (Bettis and Hitt, 1995). Technological life cycles in certain industries decreased, and customer awareness of product demand dramatically rose (Drejer, 2002). The market-positioning approach, which focuses more on analyzing external opportunity and threats in the competitive environment, cannot compete in a fiercely dynamic market (Drejer, 2002), therefore, scholars attempted to address organizational competitive advantage more from the perspective of the internal resources of firms, the so-called resource-based view (RBV).

Through observing the phenomenon of Japanese companies (for example, Sony, Honda, NEC, etc.) outperforming American companies across many industries, Prahalad and Hamel (1990) attributed the overwhelming success of Japanese companies to their internal sources, termed “core competence,” rather than

to external sources. They explored core competence using comparative cases: NEC (Nippon Electric Corporation) versus GTE (General Telephone and Electronics Corporation). In the early 1980s, GTE was a major player in the information technology industry in the United States. In the late 1980s, due to lacking communication and effective integration and synergies between SBUs, the Japanese company, NEC surpassed GTE by coordinating and multiplying internal resources across individual businesses. Using these comparative case studies, Prahalad and Hamel (1990) argued giving precedence to “core competence” over SBUs, by focusing on the integration of resources and realizing potential synergies among SBUs. Therefore, the strategic focus has transferred from outside the organization to inside, especially on organizational capabilities. Core competence manifests the ability of an organization to advantageously integrate, reconfigure, gain, and release internal resources to match or even create market change, leading to organizational competitive advantage (Eisenhardt and Martin, 2000).

The development of core competence is central to organizational learning (Lei et al., 1996; Murray, 2003; Petts, 1997) and organizational culture (Barney, 1986; Håland and Tjora, 2006; Lawler, 1994). Instead of a static stock of knowledge (Simpson, 2002), core competence develops from “collective learning in the organization” (Prahalad and Hamel, 1990: 82) generating a set of problem-defining and problem-solving insights to create competitive advantage (Lei et al., 1996) and acting as a vehicle for SBUs to find common interests, problems, capabilities or opportunities (Javidan, 1998). Organizational culture undergoes change in the development of core competence. The values, beliefs, and norms of organizational culture make it possible to control the interactions of organizational members with external stakeholders and strategically guide their behaviors toward organizational goals (Chen and Chang, 2010).

Core competence from the HRM perspective

Core competence conceptualized in HRM has been termed “competence” without “core” (Clardy, 2008), an evolution that traces back to the American behavioral psychologists Robert White and David C. McClelland (Dubois and Rothwell, 2004). White (1959) introduced the term “competence” to describe those personality characteristics associated with superior performance and high motivation (Delamare Le Diest and Winterton, 2005). The behavioral psychology perspective was established

Table 1. Core Competence from strategic management and HRM perspective.

Perspective	Strategic management	HRM
Definition	Organizational capabilities that advantageously integrate, reconfigure, gain and release internal resources to match or even create market change and lead to organizational competitive advantage	A generic knowledge, motive, trait, self-image, social role, or skill of a person that is causally related to superior performance on a job
Level	Organizational	Individual
Benefit	Organizational performance	Job performance
Approach	Top-down	Bottom-up
Attribute	Firm-specific	Generic

by Harvard psychologist David McClelland (1973), raising the question about the reliability of intelligence and the aptitude test as a predictor of job success, and believing other personal characteristics predict performance more significantly than intelligence.

The insights of McClelland affected the competence modeling movement launched by McBer and Company and the American Management Association (AMA) in the late 1970s.

The AMA was the first study to define competence as the characteristics that underpin superior job performance by the Behavioral Event Interview (*BEI*), which investigated the differences between exemplary and superior performers (Rothwell and Lindholm, 1999). The AMA identified the psychological configuration of competence as “a generic knowledge, motive, trait, self-image, social role, or skill of a person that is causally related to superior performance on a job” (Hayes, 1979). Boyatzis (1982) and colleagues at McBer initiated competence modeling by studying over 2000 managers to derive the characteristics of managers relative to effective performance across management jobs and organizations. The definition and methodology of competence by the AMA and Boyatzis have widely affected the following theoretical developments and applications.

Spencer and Spencer (1993) matured the competence modeling work. Their investigation covers more than two hundred jobs, categorized by five job families, including technical/professional, salespeople, helping and human service workers, managers, and entrepreneurs. Querying superior performers among different levels of each job family. For example, the five main competence models of the database produces “generic competence models” by conducting the BEI to find similar behavioral patterns of managers include behaviors of impact and influence, achievement orientation, teamwork and cooperation,

analytical thinking, and initiative (Spencer and Spencer, 1993).

Under the philosophy of Spencer and Spencer (1993), Lahti (1999) proposed that “core competence” exists at the individual level and affects HRM. Such “core competence” models derived from a survey of superior job performers that demonstrated a generic or universal set of behavioral characteristics to accomplish similar job tasks, so these “generic” characteristics are deemed “core” in this job class (Clardy, 2008). Competence modeling underlying human characteristics rather than job elements is anticipated to become the basis of HRM functions such as recruitment and selection, compensation, performance appraisal, and training and development (Dubois and Rothwell, 2004; McLagan, 1980; Sanchez and Levine, 2009; Soderquist et al., 2010).

COMPARING THE PERSPECTIVES OF STRATEGIC MANAGEMENT AND HRM ON CORE COMPETENCE

According to the literature, SM and HRM respectively proposed the core competence term, however their definitions of core competence differ. Table 1 shows that SM and HRM define core competence as organization- and individual-level capabilities related to organizational competitive advantage and job performance. The following section further details the SM and HRM interpretations of “core” in aspects of benefits, approaches, and attributes (Table 1).

Benefits: Organizational competitive advantage versus job performance

Referring to the aforementioned definitions of core competence, “organizational competitive advantage” and

“job performance” are the benefits of core competence pursued by SM and HRM. As mentioned above, core competence in terms of SM means the capability of a firm effectively deploying its resources. The ambiguity of the action and result for deploying resources creates barriers for competitors to imitate, and thus builds the unique position and organizational competitive advantage of a firm in the market (Reed and Defillippi, 1990). Core competence in terms of HRM derives from job analysis, and identifying personal characteristics, mostly behaviorally described, related to superior job performance. In this way, employees can demonstrate competent behaviors or proficiently execute their tasks while they learn core competence derived from superior performers (Chen and Chang, 2010).

Approaches: Top-down versus bottom-up

The approach to assess core competence has been a controversial issue. SM and HRM conduct core competence through two different analytical approaches: a strategically oriented top-down approach, and an empirically oriented bottom-up approach (Capaldo et al., 2006; Schaper, 2004). The strategically oriented top-down approach from the SM perspective explains the development of core competence from the planning of strategic workshops organized by the top and upper management downward to all members of the organization (Schaper, 2004). This approach expects core competence to convey the organizational mission and strategic intent (including sense of direction, sense of discovery, and sense of destiny to all members) (Hamel and Prahalad, 1989), direct organizational members as to what needs to be done in the future (Cardy and Selvarajan, 2006), and explicate how to fulfill strategic goals and deploy organizational resources (Clardy, 2008; Lado and Wilson, 1994; Schaper, 2004).

Core competence in terms of HRM, derived from the philosophy of Spencer and Spencer, is an empirically oriented bottom-up approach. This approach surveys the characteristics of superior performers in certain job families and elicits a set of generic definitions and profiles of competence models. The bottom-up approach focuses on the actual state of relevant job competence (Schaper, 2004) and attempts to standardize the scales and profiles of competence models to apply across various contexts and work situations (Capaldo et al., 2006). However, in light of high survey costs, HRM practitioners apply the bottom-up approach in a deductive sense (Capaldo et al., 2006). That is, the competence models of firms are

mainly adapted from competence codebooks (Spencer and Spencer’s competence modeling).

Attributes: Firm-specific versus generic

According to the various definitions, benefits, and approaches of core competence, SM and HRM describe “core” competence essentially mean “firm-specific” and “generic.” Because core competence in terms of SM is deeply embedded in organizational culture (Barney, 1986) and socially complex interactions (Barney, 1991), core competence demonstrates distinctive, value-creating, firm-specific, and inimitable characteristics in the competitive market (Capaldo et al., 2006). The four noted criteria, VRIS, valuable, rare, difficult to imitate, and difficult to substitute screen the capabilities qua core competence (Ambrosini and Bowman, 2009; Eisenhardt and Martin, 2000; Teece et al., 1997). While meeting the VRIS criteria, core competence can create competitive advantage for firms.

Labeling competence as “core” in terms of HRM lies in competence modeling garnered from the generic characteristics of superior workers who proficiently execute job tasks. Competence profiles represent a standard professional figure common to a set of performers in a job class and independent from the organizational context (Capaldo et al., 2006); competence can appear across organizations in terms of person-job match. Therefore, “core” in terms of HRM implies “generic” or “universal” behavioral characteristics.

A CONCEPTUAL FRAMEWORK OF THE RELATIONSHIPS AMONG HUMAN COMPETENCE, CORE COMPETENCE, AND COMPETITIVE ADVANTAGE

Although, SM and HRM treat “core” competence differently, SHRM synthesizes their insights to analyze macro- and micro-level capabilities. Under the motif of SHRM regarding how organizations can effectively utilize their human resources and how human resources can help organizations to create and sustain competitive advantage, SHRM scholars have redefined “core competence” at the organizational level as organizational capability and “human competence” at the individual level as people capability (Bergenhengouwen et al., 1996; Cardy and Selvarajan, 2006; Garavan and McGuire, 2001; Lahti, 1999). Similar to the SM perspective, SHRM scholars treat “core” competence with “firm-specific” attributes to create competitive advantage for firms

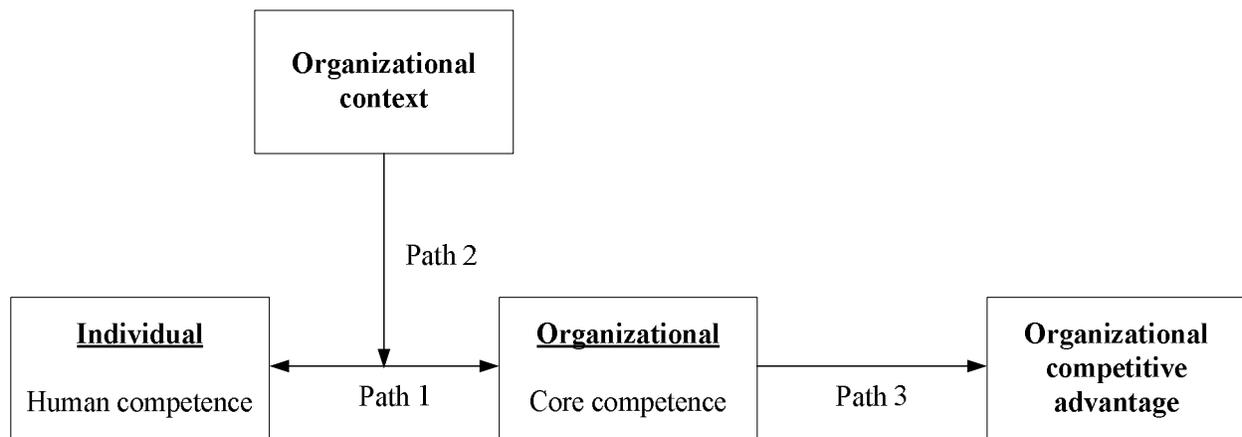


Figure 1. A conceptual framework of the relationships among human competence, core competence, and competitive advantage.

(Lopez-Cabrales et al., 2006, wherein human competence of intellectual capital was presume as the most critical element creating core competence (Chen and Chang, 2010). Figure 1 proposes a conceptual framework not only showing the relationship of core competence and human competence but also how these concepts interact within the organizational context and affect organizational competitive advantage.

Previous researches have discussed the symbiotic relationship between core competence and human competence; however few scholars have pointed out the form of this linkage (Chen and Chang, 2010). This article proposes that core competence reciprocally interacts with human competence, shown as Path 1 in Figure 1. However, the synthesis of core competence on the strategies, missions, culture, and future strategic directions of the organization directs the development of human competence, and requires personnel with certain characteristics to “make whole” or complement it (Garavan and McGuire, 2001; Lahti, 1999). Core competence is typically detached in its requirements of human competence, referring to the discrete dimensions of the professional requirements of knowledge, skills, and abilities (KSAs) (Cardy and Selvarajan, 2006; Tovey, 1994), to match candidates whose KSAs characteristics fit these requirements. Thus, core competence bears a similar imprint to the psychological characteristics of human competence (KSAs) (Chen and Chang, 2010). Human competence on behalf of this type of intellectual capital, unlike tangible assets, creates the inimitable characteristics of core competence which are the main source of competitive

advantage (Clardy, 2008).

Organizational contexts moderate core competence and human competence (shown as Path 2 in the conceptual model). The relationship between human competence and core competence manifests in a person-to-organization adjustment (Chen and Chang, 2010), achieved within certain organizational contexts created by organizational culture, vision, mission, strategy, and values (Bergenhengouwen et al., 1996; Håland and Tjora, 2006; Lahti, 1999). These organizational contexts facilitate the relationship between human competence and organizational core competence to reach the same base (Lahti, 1999). Chen and Chang (2010) proposed that shared values, mutual trust, and mutual investment manifest the organizational base and facilitate all members of organizations to share the same mindset in understanding and reaching the goals of an organization (Ulrich and Lake, 1990).

Path 3 shows core competence as the “proxy variable” of competitive advantage (Lopez-Cabrales et al., 2006). Leonard-Barton (1992) and Teece et al. (1997) explained this relation. However, Lopez-Cabrales, and Valle and Herrero (2006) further presumed that core competence and human competence could collectively define organizational competitive advantage. This presumption describes human competence as the source of competitive advantage if managers pay attention to developing organizational core competence that aligns with, building, deploying, and renewing employee competence in ways that other organizations cannot easily imitate. Lopez-Cabrales et al. (2006) further suggested human

competence relating to core competence for reinforcing organizational culture, strategic vision, obtaining employee potential, innovation, quality orientation, and company-customer loyalty.

DISCUSSION

Core competence has become the “buzz” word commonly used by scholars and practitioners. However, the definition of “core” has been contentious. The literature has presented various interpretations of “core” from SM and HRM perspectives. This article arrays the nuance of these two perspectives on “core” in aspects of benefits, approaches, and attributes. In terms of SM, core competence is a “firm-specific” capability to create competitive advantage for firms through the top-down approach. In terms of HRM, core competence is “generic” characteristics of superior job performers across firms investigated through a bottom-up approach.

In addition to clarifying core competence in terms of SM and HRM, this paper contributes to the competence concept from the SHRM perspective by redefining organizational “core competence” as organizational capability and “human competence” at the individual level as people capability. The study proposes a SHRM conceptual framework, illustrating the relationships among concepts of core competence, human competence, organizational context, and competitive advantage. This framework highlights the role of core competence and human competence to access core competence in the SHRM literature in following discussions.

Core competence, in addition to being the “proxy variable” of competitive advantage (Lopez-Cabrales et al., 2006), plays a pivotal role in SHRM. Core competence, built based on the mission and strategies of the organization, strategically directs the development of human competence in the organization. Human competence “makes whole” or complements core competence, both collectively defining competitive advantages for firms. The more deeply human competence meshes into core competence, the greater the possibility to achieve competitive advantage.

Organizational contexts also facilitate the connection between core competence and human competence. Organizational contexts such as organizational culture, vision, strategy, and mission provide a conceptual bridge between micro and macro levels of analysis and facilitate a person-to-organization adjustment (Chen and Chang, 2010). These interactive contexts not only connect core competence and human competence and develop human

competence as firm-specific, but also facilitate all members of organizations to share mindsets in understanding and reaching organizational goals (Ulrich and Lake, 1990).

Based on the SHRM perspective relating human competence to core competence, the conceptualization of human competence has changed from “job context” to “organizational context” and its attribute has changed from “generic” to “firm specific.” Because past competence assessment in adoption of traditional job analysis cannot react to a dynamic environment (Clardy, 2008), SHRM scholars attempted to conceptualize human competence from the job context to the organizational context. As mentioned earlier, human competence conceptualizes within the organizational context and aligns with core competence to develop as firm specific. Human competence developed in the organizational context demonstrates that employees share the same mindsets with the organization (Ulrich and Lake, 1990), create tacit knowledge to carry out job tasks, and thus, build imitation barriers to competitors. This argument is based on person-organization fit, manifesting that human competence is a characteristic not only of a person but also of a context (Delamare Le Diest and Winterton, 2005). In this regard, human competence varies according to organizational context. Human competence was endowed with strategic status, vertically integrating organizational strategies with HRM and affecting organizational sustained competitive advantage (Cardy and Selvarajan, 2006; Dubois and Rothwell, 2004; Lawler, 1994; Shippmann et al., 2000).

Referring to the previous discussion of the relationship between core competence and human competence, this article proposes that the top-down approach is adequate to access core competence. Clardy (2008) argued that the bottom-up approach is similar to the traditional KSAs identification analysis, job analysis of a specific job or task by assessing individual characteristics in relation to that job, regardless of organizational context and the specific needs of a firm. Therefore, “core” competence derived from the bottom-up approach actually means “generic” competence, which contributes to limited organizational performance. According to the conceptual framework, core competence embedded in organizational contexts directs employees toward future goals and facilitates a shared mindset between organization and employees. Human competence develops as firm-specific, meshes into core competence, and thus creates competitive advantage. In this regard, the presumption that core competence directs the development of human competence suggests a top-down approach. Tovey’s

(1994) strategic approach to competence assessment presents the top-down approach, starting from the strategic review, the strategic areas of competence (core competence), the identification of competence requirements (human competence), the application of human resource activities, and finally the job and business performance.

Implications

The issue regarding what “core” exactly means for core competence has confused researchers and practitioners. This article addressed this problem by reviewing the evolution of the concept of core competence in literature. The study found that SM and HRM perspectives on the meaning of “core” can be explained in aspects of benefit (competitive advantage versus job performance), approach (top-down versus bottom-up), and attribute (firm-specific versus generic). By analyzing the literature, this clarification can help researchers and practitioners avoid problems such as analyzing core competence in adopting an SM perspective but conducting a bottom-up approach.

SHRM scholars applying the insights of SM and HRM can redefine “core competence” in the organizational level as organizational capability and “human competence” in individual level as people capability. The SHRM perspective presumes that human competence should align to core competence and collectively define competitive advantages for firms. In this regard, this article proposed a SHRM conceptual framework, which might help managers and business students to understand the relationship among human competence, core competence, and competitive advantage. For example, instructors might use this model in conjunction with case studies to demonstrate how human competence interacts with core competence and how this interaction leads to a firm’s competitive advantage.

Finally, this article also provides the basis for future theoretical and empirical research. Regarding the conceptual model of the relationships among human competence, core competence, organizational contexts and competitive advantage, few researchers (Lopez-Cabrales et al., 2006) have explored the interaction effect of human competence and core competence on organizational competitive advantage. Researchers have conducted fewer investigations exploring the moderate role of organizational contexts (for example, organizational culture, vision, mission, strategy, and values) in this relationship. Because previous studies analyzing human competence of “generic” attribute by job-based approach,

the effectiveness of this approach has often been questioned since it suffers from several conceptual and practical limitations (Capaldo et al., 2006). As such, this article proposes that human competence be firm-specific, conceptualized in an organizational context rather than in a job context. In this regard, future research could propose a competence-based approach manifesting the firm-specific attribute of human competence.

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Full Length Research Paper

A cross-strait comparative study of efficiency of life insurance companies: An application of the input slack adjustment approach

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This paper applies the three-stage approach proposed by Fried et al. (2002) to analyze the efficiency of life insurance companies in the Mainland and Taiwan areas. This approach adjusts the input slacks obtained by data envelopment analysis (DEA) via the stochastic frontier analysis (SFA). Our major empirical findings are: (1) Efficiency scores of life insurance companies in both areas are significantly affected by both environmental factors and statistical noises. After input slack adjustments, the average efficiency score drops for 72.17%; (2) Compared to those companies in the Taiwan area, the life companies in the Mainland area have a large diversion in efficiency scores which range from less than 10 to 78.3%; (3) Debt equity has a significant effect to increase efficiency, indicating that increases in the market share and financial leverage ratio help promote efficiency; (4) Ownership types have different advantageous effects on different inputs. (5) The years since establishment have no significant effects on efficiency, indicating that the younger mainland Chinese life insurance companies do not have disadvantages because it is in an open and competitive market environment; (6) Under a similar environment, Taiwan-based life insurance companies are more efficient than mainland-based ones. The input slacks and managerial efficiency of life insurance companies in Taiwan and mainland China are significantly affected by environmental factors, showing that institutional reform does matter for improving the efficiency of financial institutions.

Key words: Life insurance industry, data envelopment analysis (DEA), stochastic frontier analysis (SFA), three-stage approach.

INTRODUCTION

Life insurance is a necessary complement for the social insurance and securities system (Chen and Chen, 2010), especially for the Chinese economies with higher and higher proportion with elder population. After mainland China joined WTO in 2001, overseas insurance companies enter these markets and compete with local insurance firms. Efficiency is hence an important issue for mainland Chinese firms to stay competitive. Taiwan has opened its life insurance market to overseas companies since 1986. However, a closer economic partnership is

under development for both sides across the Taiwan Strait. The life insurance companies will have stronger competition as well as cooperation once after the two sides open their markets to each other. As a result, a comparative study of life insurance companies in mainland China and Taiwan will be important for predicting the future competition and cooperation among life companies across the Taiwan Strait.

Taiwan's insurance market has been open to the world since 1986, which is much earlier than mainland China's market being open since 2001. As a result, Taiwan gained more experiences in running the insurance market. Although the people in the two economies across the Taiwan Strait share quite similar language, cultural, and risk preference backgrounds, the development stages in

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these two economies are significantly different. Compared to insurance companies in other countries or areas, the experiences and patterns of insurance companies in Taiwan are worth referring to and should be easier to follow and learn from.

The insurance market in Taiwan is relatively more mature to that in mainland China. Taiwan has a population of only 23 million. In 2006, the life insurance premium revenue in Taiwan has been up to 15.88 billion US dollars, ranking top 14 in the global economy. The life insurance density in Taiwan has been up to 2070.9 US dollars, ranking top 20 in the world. The insurance penetration rate in Taiwan has been up to 13.51%, ranking top 3 in the world. However, the life insurance market size in mainland China in 2007 is only 72.56 billion US dollars, for its population of 1.3 billion.

The life insurance industry has attracted much attention by the researchers in efficiency analysis. The existing literature focuses on two aspects: One is the comparison of efficiency measurement approach. For example, Fecher et al. (1993) studied 84 life insurance companies by data envelopment analysis (DEA) as well as stochastic frontier analysis (SFA). They find that the efficiency scores obtained by these two approaches are highly correlated. Cummins and Zi (1998) compare results obtained by the translog stochastic cost frontier and DEA and find consistent efficiency rankings. Tsay et al. (2009) takes issues with applying the three-stage data envelopment analysis (DEA). The simulations show that the finite sample performance of the proposed MLE of the censored SFA model is very promising. An empirical example of farmers' credit unions in Taiwan illustrates the comparison between the censored and standard SFA in accounting for environmental effects and statistical noise.

The other is the factors of managerial efficiency for life insurance companies. For example, Fukuyama (1997) studied the effects of ownership types on managerial efficiency of Japanese life insurance companies from 1988 to 1993. Cummins and Zi (1998) discuss the relationship between scale and returns to scale for life insurance companies. Cummins et al. (1999) study the effect of merger on life insurance companies' efficiency. Toivanen (1997) uses the translog cost frontier to study the scale and scope economies of non-life insurance industry in Finland. He finds that the retained premiums-curve of portfolio management is U-shaped and is a positive function of the number of branches. Using the CCR-DEA model, Noulas et al. (2001) study the efficiency of 126 domestic and foreign non-life insurance companies in Greece during 1991 to 1996.

The above literature only resorts to traditional DEA models which cannot eliminate inefficiency caused by statistical noises and environmental effects. As a result, efficiency scores can be over or under-computed for these life insurance companies since they are not evaluated at a relatively fair basis. Fried et al. (2002) propose a three-stage DEA approach, adjusting the inputs in order to eliminate the effects of statistical noises

and environmental factors (Yang and Chen, 2010). Therefore, this paper will apply the three-stage approach proposed by Fried et al. (2002) to comparatively compute the managerial efficiency of life insurance companies in mainland China and Taiwan.

METHODOLOGY

The three-stage approach proposed by Fried et al. (2002) is presented further, containing the following models in each stage.

Stage one: The DEA model with original inputs

In order to pursue the overall technical efficiency (OTE) in the first stage, the CCR model constructed by Charnes et al. (1978) is used. The input slacks in this paper are obtained by the CCR model. By the BCC model proposed by Banker et al. (1984), the overall technical efficiency can be further decomposed into the product of pure technical efficiency (PTE), times scale efficiency (SE) (Coelli et al., 2005).

Note that the input slacks data left censored at zero. The BCC model there will have zero input slacks than the CCR model, easily causing the second stage SFA estimation not to converge (Tsay et al., 2009). In order to overcome the censored regression problem, the CCR model with fewer zero slacks can help us obtain unbiased second stage estimation. In the DEA model, there are I decision making units, N inputs, M outputs, and K environmental factors. DEA models are often applied to compute the efficiency of DMUs with multiple outputs and inputs in various kinds of industries (Chen et al., 2010a, b, c; Lu et al., 2010; Yang and Chen, 2010).

Stage two: SFA regression

The efficiency scores obtained in stage one DEA computation are affected by managerial inefficiency, environmental variables, and statistical noises. Therefore, in the second stage, the SFA regression will analyze the factors of input slacks and decompose the effects of managerial inefficiency, environmental factors, and statistical noises. The input slack for input n of DMU i can be expressed as:

$$s_{ni} = x_{ni} - X_n \lambda \geq 0, n = 1, \dots, N, i = 1, \dots, I \quad (1)$$

Where s_{ni} is the input slack for input n of DMU i in the first stage; $X_n \lambda$ is the minimum (projected) input x_{ni} for input n of DMU i .

A stochastic cost frontier regression is then applied to analyze the factors of input slacks:

$$s_{ni} = f^n(z_i; \beta^n) + v_{ni} + u_{ni}, n = 1, \dots, N, i = 1, \dots, I \quad (2)$$

Where $z_i = [z_{i1}, \dots, z_{iK}]$, $i = 1, \dots, I$ are K observable environmental variables; $f^n(z_i; \beta^n)$ is the deterministic input slack frontier; the vector β^n contains the unknown parameters to estimate; v_{ni} and u_{ni} ($u_{ni} \geq 0$) represent the statistical noise and managerial inefficiency of input n for DMU i . The conditional

Table 1. Summary of statistic of input and output variables.

Variable	Number of DMUs	Minimum	Maximum	Average	Standard error	
Output	Premium revenue	360	0.00	23776.40	1297.85	3012.68
	Investment revenue	360	10.00	11059.49	245.77	826.21
Input	Debt	360	18.00	381587.14	5805.29	22857.46
	Equity	360	165.36	21188.42	953.11	1898.38
	Employees	360	17.00	96698.00	7310.62	16315.91

The monetary unit is million USD in 2002 prices.

Table 2. Correlation coefficients among input and output variables.

Variable	Premium revenue	Investment revenue	Debt	Equity	Employee
Premium revenue	1.0000				
Investment revenue	0.7976	1.0000			
Debt	0.5659	0.5368	1.0000		
Equity	0.7556	0.8098	0.3881	1.0000	
Employees	0.9211	0.7487	0.5784	0.6746	1.0000

expected estimate of v_{ni} can be expressed as:

$$\hat{E}[v_{ni}|v_{ni} + u_{ni}] = s_{ni} - z_i \hat{\beta}^n - \hat{E}[u_{ni}|v_{ni} + u_{ni}],$$

$$n = 1, \dots, N, \quad i = 1, \dots, I. \quad (3)$$

Finally, the inputs of these DMUs are adjusted with the following formula:

$$x_{ni}^A = x_{ni} + [\max_i \{z_i \hat{\beta}^n\} - z_i \hat{\beta}^n] + [\max_i \{\hat{v}_{ni}\} - \hat{v}_{ni}],$$

$$n = 1, \dots, N, \quad i = 1, \dots, I, \quad (4)$$

Where x_{ni}^A and x_{ni} are the inputs after and before adjustments of input n for DMU i ; $\max_i \{z_i \hat{\beta}^n\}$ represents the maximum projected input slack caused by environmental factors for input n in the same year; and $\max_i \{\hat{v}_{ni}\}$ represents the maximum projected input slack caused by statistical noise for input n in the same year.

Stage three: The DEA model with adjusted inputs

We then run the CCR model again with the adjusted inputs x_{ni}^A , $n = 1, \dots, N$, $i = 1, \dots, I$. The efficiency scores without distortions from environmental and statistical noise can hence be obtained.

Data sources and variable descriptions

In our dataset, there are 41 and 28 life insurance companies in the mainland China and Taiwan respectively, making a total of 69. The sample period is from 2002 to 2007. The data sources are China

Insurance Year book (2003 to 2008) and Insurance Year Book of Taiwan (2003 to 2008), respectively. Note that all of the life companies with complete data are included in this dataset and hence, our research objects are quite close to the whole population of life insurance companies in these two economies.

There are three input variables in the DEA model: The first input is the total number of employees since the life insurance industry is labor intensive. The second input is the debt equity which reflects the scale of business. The third input is equity capital which reflects the warranty to give benefit payments to the insured. There are two output variables in the DEA model: The first output is the insurance premium revenue which is the result of a life insurance company's operations. The second output is investment revenue which comes from the financial intermediacy function of a life insurance company. All nominal variables are transformed into real variables in 2002 by GDP deflators in each economy and then transformed into US dollars by annual exchange rates.

Table 2 shows that the inputs and outputs used in this paper all satisfy the isotonicity property such that an output does not decrease with any input. Moreover, although each correlation coefficient between an output and an input is high, each correlation coefficient between any two inputs or any two outputs is relatively lower. This implies that all inputs and outputs are necessary and cannot be replaced by another input or output.

There are 10 environmental variables in the SFA regression. These environmental variables catch up the macroeconomic and institutional differences in these two economies across the Taiwan Strait. The first one is degree of economic freedom to reflect the difference in macroeconomic environments, as summarized in Table 3. The second one is the per capita income is used to measure the potential market size. The third one is the per capita savings rate to depict the people's income disposal preference. The fourth one is the number of establishment years, reflecting the business experience of a life insurance company. The fifth one is the asset scale to represent the degree of scale economy or dis-economy. The sixth one is the market share to measure the market power of a life insurance company. The seventh is the financial leverage ratio to measure a DMU's borrowing ability and financial flexibility. The eighth one is the overseas ownership (with overseas

Table 3. The scores and rankings of degrees of freedom for Mainland China and Taiwan.

Year	Mainland China		Taiwan	
	Score	Ranking	Score	Ranking
2002	52.8	116	71.3	22
2003	52.6	120	71.7	21
2004	52.5	124	69.6	26
2005	53.7	113	71.3	20
2006	53.6	117	69.7	30
2007	52.0	133	69.4	29

Data source: <http://www.heritage.org/index/>.

Table 4. The average OTE scores without adjustments for life insurance companies in Mainland China and Taiwan.

Year	Average OTE score in both economies	Average OTE score in Mainland China	Average OTE score in Taiwan
2002	0.914	0.913	0.915
2003	0.842	0.826	0.859
2004	0.916	0.914	0.918
2005	0.566	0.507	0.642
2006	0.840	0.852	0.823
2007	0.809	0.869	0.726
Five-year average	0.815	0.813	0.814

mono-ownership as 1 and otherwise as 0). The ninth one is the joint ownership (with joint ownership as 1 and otherwise as 0). The tenth one is the mainland China base (with mainland China-based companies as 1 and otherwise as 0).

EMPIRICAL FINDINGS

Stage one results

The stage one analysis computes the OTE scores of 69 life insurance companies before adjustments, to get rid of environmental effects and statistical noises. Only the observations in the same year are included in each DEA model, that is, efficiency scores are obtained by comparing to the annual efficiency frontier constructed by DMUs in the same year. Table 4 shows that the average OTE score of life insurance companies in mainland China and Taiwan is 0.815 from 2002 to 2007. The average OTE scores generally go down in these six years, showing a wider dispersion among the managerial efficiency of these life insurance companies. The six-year average OTE score of mainland Chinese life insurance companies is 0.813, which is slightly lower than that of the Taiwanese ones. The trends OTE scores across the Taiwan Strait are consistent, where both generally show a decline.

Stage two results

In stage two, the three kinds of input slacks are used as

the explained variables in the stochastic cost frontier regressions in which those ten environmental variables are explanatory variables. A higher value of an input slack implies a more inefficient use in this specific input. The regression results are listed in Table 5, which can come up with the findings listed thus:

i. Enhancing the degree of economic freedom significantly helps reduce the input slacks in debt capital and employees. Therefore, a higher degree of economic freedom significantly helps increase the managerial efficiency in both economies. An increase in per capita income significantly helps promote managerial efficiency by decreasing employee slacks, that is, as per capita income increases, on average, each life insurance employee can have generate more outputs. An increase in the savings rate significantly increases the debt capital and employee slacks, implying that personal savings is an effective substitute for life insurance. The number of establishment years has no significant effect on all input slacks, implying that newly established life insurance may not have disadvantages because of lack of business experiences in these two Chinese economies.

ii. An increase in the assets significantly increases all of the three input slacks, implying scale diseconomies. Therefore, expanding the asset scale may not be an efficient way to improve competitiveness. An increase in market share significantly reduces debt capital and equity capital slacks, but increases employee slacks. This is because an increase in the market share generates a

Table 5. The SFA regression results on input slacks for life insurance companies in Mainland China and Taiwan.

Variable	Slack of debt capital	Slack of equity capital	Slack of employees
Constant	15654.558 - (35.2582)	-8049.4635- (1.8935)	-12309.602- (1.1841)
Degree of economic freedom	-240.9491 - (47.6313)	94.3766- (4.6707)	129.2024-(56.5518)
Annual per capita income	-0.3733- (0.1444)	0.1148- (0.0151)	0.0302 (0.1773)
Annual per capita savings rate	83.8546- (48.8098)	-1.1078 (4.8045)	100.494- (56.0039)
Establishment years	0.5803 (10.7685)	-0.0725 (0.7413)	2.5137 (6.9073)
Assets scale	0.6668- (0.0192)	0.0133- (0.0021)	0.0734- (0.0198)
Market share	-1603.0991- (71.4950)	-0.2231 (3.4169)	227.1646- (34.2220)
Financial leverage ratio	393.1948- (28.4766)	-24.5237- (3.3944)	-59.2104- (30.2564)
Overseas mono-ownership	1111.4232-(151.2176)	-65.4038- (16.6283)	-125.0286-(27.4403)
Joint ownership	969.9972- (511.2912)	-72.0142-(38.1821)	849.1462- (106.8907)
Mainland China-based	-9255.8753-(28.5809)	3035.8027- (1.3973)	-571.1809- (1.0496)
σ^2	2.102E+07- (1.0021)	169634.37- (1.2860)	15008778- (1.0002)
γ	0.5862- (0.0359)	0.3256-(0.0505)	0.1220- (0.0709)
Log-likelihood function	-3456.7654	-2641.5059	-3472.4883

*, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. The numbers in parenthesis are standard errors.

Table 6. The average adjusted OTE scores of life insurance companies in Mainland China and Taiwan.

Year	Average OTE score of both economies	Average OTE score in Mainland China	Average OTE score in Taiwan
2002	0.152	0.128	0.172
2003	0.144	0.101	0.190
2004	0.151	0.102	0.206
2005	0.141	0.095	0.199
2006	0.131	0.089	0.190
2007	0.155	0.117	0.206
Mean	0.146	0.105	0.194

pressure toward hiring more employees. An increase in the financial leverage ratio significantly decreases all three input slacks, implying that financial flexibility is beneficial to managerial efficiency improvement.

iii. Overseas mono-ownership, joint ownership, mainland-based ownership, and Taiwan-based ownership have different kinds of advantages. Overseas mono-ownership significantly helps reduce equity capital and employee slacks, but not for reducing debt capital slacks. Joint ownership is good for reducing debt capital and equity capital slacks, but was increasing the employee slacks.

The mainland-based ownership is good for reducing debt capital and employee slacks, but is increasing the debt capital slacks. As a result, different types of ownership have their own advantages to compete in these two economies. This may explain why this is a variety of ownership types in insurance markets across the Taiwan Strait.

Stage 3 results

The inputs are adjusted according to Equation (4), in

order to get rid of the distortions caused by environmental effects and statistical noises. The OTE scores after adjustments are shown in Table 6. Comparing Tables 4 and 6, we find that after adjustments, the six-year average OTE scores decrease from 0.814 to 0.146, showing that the life insurance industry is heavily affected by environmental effects and statistical noises. After adjustments, the mainland Chinese life insurance companies have much lower OTE scores (0.105) than Taiwanese ones (0.194), showing that mainland Chinese companies are much more affected by both environmental factors and statistical noises.

Table 7 lists the top 10 efficient life insurance companies before and after adjustments. Before adjustments, the top 3 efficient life insurance companies in both economies are New China Life Insurance (CN), Samsung Air China Life Insurance (CN), and Chung Hwa Life Insurance (TW). However, after adjustments, the top 3 efficient life insurance companies in both economies become Cathay Life Insurance (TW), China Life Insurance (CN), and Nan Shan Life Insurance (TW). Therefore, if in the future both economies further open their life insurance markets to each other, then under the same environments,

Table 7. The top ten efficient life insurance companies before and after adjustments.

Before adjustments		After adjustments	
Name	OTE ranking	Name	OTE ranking
New China Life Insurance (CN)	1	China Life Insurance (CN)	1
Taikang Life Insurance (CN)	2	Cathay Life Insurance (TW)	2
China Postal Life Insurance (TW)	3	China Ping An Insurance (CN)	3
Kuo Hua Life Insurance (TW)	4	Nan Shan Life Insurance (TW)	4
Allianz President Insurance (TW)	5	Shin Kong Life Insurance (TW)	4
China Pacific Life Insurance (CN)	6	China Pacific Life Insurance (CN)	6
Cathay Life Insurance (TW)	7	China Postal Life Insurance (TW)	7
Shin Kong Life Insurance (TW)	8	ING Antai Life Insurance (TW)	8
Metropolitan Life Insurance (CN)	9	Taikang Life Insurance (CN)	9
China Life Insurance (CN)	10	Fubon Life Assurance (TW)	10

CN: Mainland China-based; TW: Taiwan-based.

Table 8. The distribution of adjusted OTE scores for life insurance companies in mainland China and Taiwan (Unit: %).

Year	OTE = 1.000		0.500 ≤ OTE < 1.000		0.100 ≤ OTE < 0.500		OTE < 0.100	
	Mainland China	Taiwan	Mainland China	Taiwan	Mainland China	Taiwan	Mainland China	Taiwan
2002	3.85	4.76	7.69	4.76	26.92	14.29	61.54	76.19
2003	3.57	3.33	10.71	6.67	32.14	6.67	53.57	83.33
2004	3.57	3.13	7.14	3.13	42.86	12.5	46.43	81.25
2005	3.57	2.78	7.14	2.78	42.86	13.89	46.43	80.56
2006	0.00	5.13	10.71	0.00	42.86	7.69	46.43	87.18
2007	3.70	2.70	7.41	8.11	48.15	5.41	40.74	83.78
Mean	3.04	3.64	8.47	4.24	39.3	10.07	49.19	82.05

the performance rankings of these life companies may drastically change.

Table 8 shows the distribution of adjusted OTE scores of these life insurance companies. If the two markets are further open to each other, up to 78.3% of mainland-based life insurance companies will have extremely low OTE scores less than one, compared to the extremely inefficient Taiwan-based insurance companies, only accounting for 25.71% among them. Under a homogeneous environment, the Taiwan-based life insurance

companies will perform more efficient than those mainland-based ones. Therefore, if both sides across the Taiwan Strait reach a memorandum of understanding for financial markets in the near future, in the short run, the Taiwan-based life insurance companies may enjoy more market expansion than the mainland-based ones.

CONCLUDING REMARKS

This paper applies the three-stage approach

proposed proposed by Fried et al. (2002) to analyze the efficiency of life insurance companies in the Mainland and Taiwan areas. This approach adjusts the input slacks obtained by data envelopment analysis via the stochastic frontier analysis. This approach compares the managerial efficiency of these life insurance companies under similar environment and luck. Our major empirical findings are listed thus:

- 1) Efficiency scores of life insurance companies in

both areas are significantly affected by both environmental factors and statistical noises. After input slack adjustments, the average efficiency score drops for 72.17%.

2) Compared to those companies in the Taiwan area, the life companies in the Mainland area have a large diversion in efficiency scores which range from less than 10 to 78.3%.

3) Debt equity has a significant effect to increase efficiency, indicating that increases in the market share and financial leverage ratio help promote efficiency.

4) Ownership types have different advantageous effects on different inputs.

5) The years since establishment have no significant effects on efficiency, indicating that the younger mainland Chinese life insurance companies do not have disadvantages because of it in an open and competitive market environment.

6) Under a similar environment, Taiwan-based life insurance companies are more efficient than mainland-based ones.

It is worth noting that in 2007, savings amount in Mainland China has been up to 2529.41 billion US dollars, accounting for 50% of the people's income. This paper finds a strong adverse effect of per capita savings ratio on efficiency of life insurance companies since personal savings is a substitute for life insurance. It is very important to educate the people in mainland China to select and use life insurance to cover their own risk. Moreover, this paper finds that the input slacks and managerial efficiency of life insurance companies in Taiwan and mainland China are significantly affected by environmental factors, showing that institutional reform does matter for improving the efficiency of financial institutions. If mainland China wants to further attract more overseas investment, it should continue to reform and open its financial markets.

Since different ownership types have different advantage in using different inputs, it is hard to ex ante judge which ownership type is superior to others. The best way to promote managerial efficiency is hence to have an open and transparent life insurance market such that fair competition can continuously improve managerial efficiency.

Moreover, both sides across the Taiwan Strait are trying to reach a memorandum of understanding on financial markets. Once after the life insurance markets are open to each side, this research expects Taiwan-based companies to be more efficient in the short run. However, via competition and cooperation among the life insurance companies in mainland China and Taiwan, the managerial efficiency of mainland Chinese ones can also be promoted.

Due to data limitation, the DEA model in this paper does not incorporate the service quality and investment risks. This limitation also exists in the previous literature using the DEA approach to study insurance companies.

This limitation may make the computed efficiency scores be in favor of the life insurance companies in mainland China which have much larger output scales. It is generally agreed that the insurance companies in Taiwan have better service quality and risk management. The efficiency scores of Taiwan's life insurance companies should further improve if the service quality and investment risks are included into the DEA model.

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Full Length Research Paper

Empirical analysis of technological innovation capacity and competitiveness in EU-15 countries

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This paper carries out an analysis of the existence and characteristics of technology innovation clusters in EU-15 countries, also studying if belonging to a group or cluster explains differences in competitiveness among countries. Based on the main Science and Technology Indicators 2009 published by Eurostat (European Commission, 2009a) in addition to competitiveness indicators used by the European Commission (2009b), the World Economic Forum (2009) and IMD (2008), an empirical study has been conducted- using a cluster analysis – about the technological innovation and competitiveness variables for each country during the period 1998 to 2008. The results indicate the existence of five distinct groups of countries characterized by different levels of technological innovation and competitiveness.

Key words: Technological innovation, competitiveness, cluster analysis, EU-15.

INTRODUCTION

Science and technology levels have been measured by Governments and researchers in industrialized countries for the last 50 years, but interest has been growing recently, due to the generally accepted belief that technology is a key explanatory variable for competitiveness, growth, productivity, job creation and wealth (Juma et al., 2001). Being able to measure a country's capacity for innovation has interest at the national level, as it is generally accepted that technological innovation is one of the main factors to achieve sustainable economic growth (Grupp, 1998; 2004).

According to Porter (1991), innovation, whether it relates to processes, products or organizations, determines the competitiveness of a nation, which depends ultimately on the companies' ability to innovate and improve.

All these theories have resulted in a variety of studies on the relationship between innovation and national

competitiveness, such as Solow (1956), Soete (1981), Fagerberg (1987), Porter (1990), Calvert et al. (1996) and Griliches (1998); although these papers do not agree on a single theory on the relationship between innovation and competitiveness, they do clarify the determining factors of innovative conduct and its implications on national competitiveness.

During the last years, a number of empirical studies have attempted to measure different aspects of the technological capabilities and components that may have an influence on national competitiveness (Grupp and Moge, 2004; Archibugi and Coco, 2005; IMD, 2009; WEF, 2009).

In addition, the concept of differences in technological capacity between countries as one of the major factors explaining the existence of country clusters is a hypothesis worth investigating for innovation researchers (Godinho et al., 2005). For that reason, throughout this work, the study endeavours to answer the question concerning the role of technological innovation capacity and competitiveness of the different countries in order to form clusters.

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Based on literature on national innovation capacity, economics of technological change and national competitiveness, the objective of this paper is to study the existence and features of technological innovation clusters in EU-15 countries, analyzing if belonging to a group or cluster helps explaining the differences in competitiveness among these economies. For that purpose, a cluster analysis has been conducted to gather the countries of EU-15 within groups of homogeneous behaviour, according to selected variables of technological innovation and competitiveness. This grouping of countries, based on their degree of similarity, can contribute to a better appreciation and evaluation of innovative activity in each case.

COMPETITIVENESS

The concept of competitiveness can be analyzed from different levels: firm, industry or sector, and nation (Industry Canada, 1995). In this paper, the focus was on national competitiveness and its relationship with the technological innovation levels of the different countries.

There is a widespread acceptance of the importance of competitiveness, although different definitions still stand. National competitiveness has historically been associated to some macroeconomic variables, like the exchange rates, prices or export shares and there is a generalized notion that the competitiveness of a country is related to its participation in world markets (Solleiro and Castañón, 2005). This approach implies a zero-sum game, as one country's gain come at the expense of others (World Economic Forum, 2006) and has been criticized by several authors who consider that other aspects should also be taken into account.

The definition of national competitiveness has lately evolved to a more complex concept that includes both macroeconomic and microeconomic factors. Some authors (Scott, 1985; Storper, 1997) include references to income and standard of living in their definitions of competitiveness. Porter (1990) argues that competitiveness is strongly linked with productivity and the standard of living of a country, and shows that pure macroeconomic variables are not sufficient to explain the welfare of a country: for example, in 1970s and 1980s, several countries achieved high levels of welfare while suffering macroeconomic problems (Japan had a strong budget deficit, Korea and Italy, both with high interest rates, or Germany and Switzerland, that suffered strong currency appreciation). According to Porter (1990), competitiveness is determined by the productivity with which a nation utilizes its human, capital, and natural resources to produce goods and services. Competitiveness thus depends on the microeconomic capability of the economy explained by the sophistication of the companies and the quality of the national business environment.

Different efforts have been made to evaluate and

measure the competitiveness of the countries. There are two exhaustive and acknowledged studies on competitiveness: the Competitiveness Yearbook, elaborated by the International Institute for Management Development and the Global Competitiveness Report, published by the World Economic Forum. Both institutions analyze the many factors enabling national economies to achieve long-term prosperity and competitiveness including different macroeconomic and microeconomic variables that determine the level of productivity of a country. These two international organizations propose the following definitions of competitiveness:

- i. The International Institute for Management Development (IMD) defines competitiveness as "the capacity of a country or a company to create greater prosperity than its competitors in international markets" (IMD, 2010).
- ii. The World Economic Forum (WEF) defines competitiveness as the "group of institutions, policies and factors that determine the level of productivity of a given country" (WEF, 2009).

The study also considered European Innovation Scoreboard (EIS), as an initiative of the European Commission to evaluate and compare the innovation results of the European Union country members.

TECHNOLOGY INNOVATION CAPACITY

The concept of technological capacity has been studied by numerous authors. Although the concept was initially used for company analysis, it has also been applied to industries and countries. Lall (1992) emphasized three aspects defining the "national technological capacity" as: 1) The ability to gather the financial resources needed and their efficient use; 2) Abilities, including not only general education, but also technical and managerial specialization; and 3) What the author called "national technological effort", associated to measures such as investment in R+D, patents and technical staff (Fagerberg, 2008). This implies that both company specific factors and national factors (incentives, institutional structure, resource allocation, human capital and technological effort) are important in the generation of technological capabilities. Thus, it is possible to identify the accumulation of technological capabilities both at microeconomic level (in companies) and at national or macroeconomic level. Therefore, the production of indicators of technological innovation capabilities has recently developed and grown, both at micro and macro levels. In fact, data collections and surveys are carried out systematically at the enterprise, industry, technology and country level (Sirilli, 1997; Smith, 2005).

To make the selection of indicators, the study took into account some previous studies that will be further discussed in this paper, and it relied on the conceptual

framework of national innovation capacity, defined as the ability of a country as a political and economic entity, to produce and commercialize in the long-term, a flow of "new technologies to the world" (Furman et al., 2002). The main purpose of the indicators is to compare different countries' positions and their changes. At this point, Archibugui et al. (2009) raises two interesting methodological issues. The first issue relates to the use of "countries" as the unit of analysis, because countries are composed of different areas and regions that can be heterogeneous. In this regard, the ability to make comparisons between countries is based on the assumption that a national innovation system is able to distribute knowledge throughout the country (Patel and Pavitt, 1995). On the other hand, a second question that may arise is the usefulness of international comparisons, since differences in technological capabilities can be very large between certain countries, and comparisons might have more meaning if they are made between similar national innovations systems, this being one of the reasons that led us to focus our research in EU-15.

DEFINITION AND RATIONALE OF THE INDICATORS USED IN THE EMPIRICAL ANALYSIS

The study will now describe the indicators to be used as dimensions and variables in the empirical analysis of this work. They correspond to the main Science and Technology Indicators 2009 published by Eurostat (European Commission, 2009a) in addition to competitiveness indicators used by the European Commission (European Commission, 2009b), the World Economic Forum (World Economic Forum, 2009) and the International Institute for Management Development (IMD, 2008) (Table 1).

'Dimensions' are defined as sections in which variables are grouped according to their scope of information. They are:

- i. Research and development.
- ii. High technology industries and knowledge-intensive services.
- iii. Patents.
- iv. Human resources in science and technology.
- v. Competitiveness.

Research and development

Research and development (R&D) activities are considered the main vehicle for development, innovation, and economic growth. The basic measure is expenditure on R&D activities made by a statistical unit or a sector of the economy over time (European Commission, 2009a). The variables used as an indicator for the R&D dimension in this study are:

- i. Total R&D expenditure as a percentage of GDP.

- ii. Total R&D expenditure by source of funds: enterprises, percentage of total.
- iii. Total R&D expenditure by source of funds: public sector, percentage of total.
- iv. Total number of researchers.
- v. Staff employed on R&D as a percentage of the labour force.
- vi. Share of women in research as percentage of total researchers.
- vii. Share of government budget for R&D as a percentage of total general government expenditure.

High technology industries and knowledge-intensive services

In industrialized countries, the creation, development, and commercialization of new technologies are an imperative to remain competitive. High-tech sectors are essential to economic growth, productivity and welfare, and are generally a source of high value-added and well-paid, employment. Therefore, technology-intensive firms are vital in ensuring the competitiveness of nations (European Commission, 2009a). The variables used to describe this dimension are:

- i. Exports of high technology products as a share of total exports.
- ii. Employment in high and medium-high technology manufacturing sectors as a share of total employment.
- iii. Employment in knowledge-intensive services sectors as a share of total employment.

Patents

Patents are documents that represent technical inventions that have been passed by a patent office, both to ensure its novelty and to clarify its potential usefulness, and therefore, are an important source of information for technological development (European Commission, 2009a). Variables chosen as representative of the patents dimension are:

- i. Patent applications to the European Patent Office (EPO) as number of applications per million inhabitants.
- ii. Total European patent applications: EPO and Patent Cooperation Treaty as number of applications per country.
- iii. European patents in high technology as number of patents per million inhabitants.
- iv. Patents granted by the United States Patent and Trademark Office (USPTO) as number of patents per million inhabitants.

Human resources in science and technology

The indicators on human resources in science and

Table 1. Selection of dimensions and variables.

Dimension	Variable	Definition
Research and development	01. % Tot. Exp. R&D	Total expenditure on R&D (% GDP)
	02. % Tot. Exp. Bus.	Total R&D expenditure by source of funds: enterprises, percentage of total expenditure on R&D
	03. %Tot. Exp. Pub	Total R&D expenditure by source of funds: public sector, percentage of total expenditure on R&D
	04. Tot Research	Total number of researchers
	05. % Emp. R&D	Staff employed on R&D as a percentage of the labour force
	06. % Women	Percentage of women in research (% of total researchers)
	07. % Gov. Budg.	Government budget for R&D (% general government expenditure)
High technology and knowledge intensive services	08. % Exp Tec	Exports of high technology products (% of total exports)
	09. % Empl Tec	Employment in high and medium-high technology manufacturing sectors (% of total employment)
	10. %Empl Know	Employment in knowledge intensive services (% of total employment)
Patents	11. EPO	Patent applications to the European Patent Office (number of applications per million inhabitants)
	12. Tot Pat	Total European patent applications: EPO and Patent Cooperation Treaty (number of applications per country)
	13. Pat Tec	European patents in high technology (number of applications per million inhabitants)
	14. USPTO	Patents granted by the United States Patent and Trademark Office (USPTO) (number of patents per million inhabitants)
Human resources in science and technology	15. %HRST	Human resources in science and technology (% of total labour force)
Competitiveness	16. EIS	European Innovation Scoreboard, innovation performance indicator
	17. GCI	Global Competitiveness Index , competitiveness index
	18. IMD	Institute for Management and Development, competitiveness index

Source: Elaboration from European Commission (2009a, 2009b); WEF (2009); IMD (2008).

technology contribute significantly to measure the new knowledge-based economy and to review the demand and supply of highly qualified personnel in science and technology (European Commission, 2009a).

The study uses a single variable to describe the human resources in the science and technology dimension: Human resources in science and technology as a percentage of the total labour force.

Competitiveness

Differences in competitiveness among the groups of countries in the EU-15 will be analyzed through the data provided by the following indicators:

i. European Innovation Scoreboard (EIS): It is based on analysis of statistics published by Eurostat and data published by other international sources (European Commission, 2009b).

ii. Global Competitiveness Index (GCI): Is the main indicator of competitiveness used by the WEF (World Economic Forum). This index considers several components, each capturing a different aspect of the complex concept of competitiveness. The information is grouped in three blocks: Basic requirements, Efficiency enhancers and Innovation factors (World Economic Forum, 2009).

iii. International Institute for Management and Development (IMD): This Swiss institution publishes the World Competitiveness Ranking in collaboration with the University of Chile School Of Business. It focuses on four major factors that shape the competitive environment of an economy; Economic performance, Government efficiency by promoting competition, Business efficiency and infrastructure (IMD, 2008).

From these indicators, the study chooses a set of variables representing the dimension of 'competitiveness' (Table 1). These 18 defined variables constitute the whole range of ordered data that will be analyzed to

reveal the distribution of the technological innovation capacity and competitiveness in the EU-15 and to measure the differences among those countries in the period 1998 to 2008.

With regards to innovation variables, the reasons for this selection of indicators were as follows:

- i) From a purely conceptual point of view, the study has followed the path marked by previous studies (World Economic Forum, 2009; Archibugi and Coco, 2004a, b; UNDP, 2001) which argue that these variables represent different aspects of the cumulative national technological process, called the innovation capacity of a nation (for example, patents) (Castellacci and Archibugi, 2008).
- ii) The availability of abundant and reliable data for the countries studied in the 1998 to 2008 period is decisive.
- iii) The choice of these indicators allows simultaneous consideration of input and output measures, and thus, enables a more comprehensive study of the importance and effectiveness of R&D. This is especially appropriate because input measures mainly consider the effort devoted to R&D, but output measures focus on the effectiveness of those measures to produce new knowledge (Sancho, 2002).
- iv) The indicators has the advantage of providing a more precise categorization of the positions of the countries than using a single, indirect indicator.

METHODOLOGY

The methodology used for the empirical analysis, whose objective is to analyze the existence and characteristics of technology innovation clusters in EU 15 countries is presented, and also, if belonging to a group of cluster helps to explain the differences in competitiveness among these economies is assessed.

For that purpose, the study first calculates the average values for each of the variables earlier described, during the period 1998 to 2008 for every country in the EU-15. The countries included are: Germany (DE), Austria (AT), Belgium (BE), Denmark (DK), Spain (ES), Finland (FI), France (FR), Greece (EL), Netherlands (NL), Ireland (IE) Italy (IT), Luxembourg (LU), Portugal (PT), United Kingdom (UK) and Sweden (SE).

Secondly, groups are identified through a cluster analysis, applying the hierarchical algorithm of the minimum variance or Ward Method (forming clusters by minimizing the sum of squares) to the standardized values of the variables. The cluster analysis is widely used in this type of studies (Mehra, 1996; Nath and Gruca, 1997; Veliyath and Ferris, 1997; Short et al., 2002; López and Vázquez, 2007; Castellacci and Archibugi, 2008; European Commission, 2009b).

The main criticism made of cluster analysis is that it considers, a priori, the existence of homogeneous groups or clusters. To determine the number of clusters to be formed, the present work has applied two constraints which are used as standards in this type of investigations (Harrigan, 1985; Lewis and Thomas, 1990; Fiegenbaum and Thomas, 1990). These two restrictions are: 1) groups observed must explain, at least, 65% of the total variance; and 2) adding another group means an improvement in total adjustment of, at least, 5%.

At this point, trials are conducted. Table 2 shows the results obtained in terms of both restraints, for four, five and six clusters. Obviously, the three variables in the competitive dimension are

excluded from the analysis, since the competitiveness dimension is precisely the one to be contrasted. It can be seen how the number of clusters formed is five.

The next and final step in the empirical process is to validate the cluster structure. For that purpose, the study must determine if there are significant differences between the groups obtained. This is achieved through the p-value of the F test, resulting from an ANOVA analysis, which examines the individual variance for each of the variables. It can be stated that there is a statistically significant difference (with a confidence level of 95%) between the average values of each variable in each cluster, if the p-value of the F test is below 0.05. Table 3 summarizes the results for the case of five clusters.

Analyzing the results of p-value of the ANOVA F test, the study observes that all variables except one are significant, as the contrast F is below 0.05. The exception variable corresponds to the percentage of women researchers. Table 4 summarizes the results obtained in the above table for the variables of competitiveness. Consequently, results confirm that differences in technological innovation and competitiveness among the clusters are significant.

ANALYSES OF RESULTS

The countries that form the five groups have been defined as: 1) Leaders (in technological innovation); 2) Followers (in technological innovation); 3) Mediterranean; 4) Moderate; and 5) Germany, being classified as shown in Table 5.

Table 6 presents the averages of 18 selected variables for each group, and the average of the total sample of 15 countries as a whole. At the end of the table, the variable, Total Population, shows the average of the total population for each group in December 2008, and is useful to analyze the variables, Total Number of Researchers, and European Patent Applications, when measured in absolute terms.

The major characteristics of each of the five clusters obtained, based on the analysis of the data presented in Table 6, are discussed further.

Leaders

This group consists of Finland and Sweden. The different variables are analyzed now, and it can be observed how these two Scandinavian countries are at the forefront of the group in most of them and it is the reason to designate them as leaders. Beginning with the first dimension, the leaders are the ones that increased more on their expenditure on R&D in relation to GDP, with 3.56%, which means 88% above average; those with the highest percentage of staff employees on R&D with 1.85 and 58% above average; and within that staff, they have the highest percentage of women with 39.25%, which is also above average by 29%. In addition, the weight of the government budget for R&D is the highest of the five groups, with 1.75 and 24% above average. Therefore, it can be observed that in the dimension of research and development, the leaders obtain the best results of the five groups in four variables, indicating the importance that these countries place on that dimension.

Table 2. Variance adjustment.

Variable	4 Clusters	5 Clusters	6 Clusters
01. % Tot. Exp. R&D	89.99	88.78	88.90
02. % Tot. Exp. Bus.	56.27	79.61	74.72
03. %Tot. Exp. Pub	65.84	78.63	73.65
04. Tot Research	35.43	32.46	53.05
05. % Emp. R&D	59.82	85.71	84.10
06. % Women	43.69	42.11	44.07
07. % Gov. Budg	0.00	17.38	6.18
08. % Exp Tec	45.63	45.10	78.12
09. % Empl Tec	43.04	68.72	62.76
10. % Empl Know	77.50	73.73	67.74
11. EPO	82.09	81.58	89.89
12. Tot Pat	86.78	85.92	86.29
13. Pat Tec	77.30	74.92	73.55
14. USPTO	93.63	93.93	95.30
15. %HRST	67.52	61.51	59.48
Average	61.64	67.34	69.19
% Variation	18.11	9.25	2.74

Source: Own preparation.

Table 3. Descriptive statistics of clusters (average and standard deviation) and test ANOVA for 5 clusters.

Variable	C1(n=2)	C2 (n=6)	C3 (n=4)	C4 (n=2)	C5 (n=1)	F ANOVA	p-value
01. % Tot. Exp. R&D	3.56 0.25	2.04 0.26	0.91 0.23	1.42 0.29	2.48 0.00	40.04	0.0000
02. % Tot. Exp. Bus	67.40 1.44	52.54 7.24	37.58 8.47	71.10 14.99	66.16 0.00	7.75	0.0041
03. %Tot. Exp. Pub	54.92 1.49	31.91 5.78	48.59 7.66	20.64 10.20	30.68 0.00	7.85	0.0039
04. Tot Research	64.987 18.125	130.803 141.303	84.747 64.497	9.794 10.581	413.721 0	2.69	0.0429
05. % Emp. R&D	1.85 0.36	1.20 0.15	0.66 0.12	1.45 0.96	1.20 0.00	4.35	0.0270
06. % Women	39.25 12.84	27.04 6.39	36.40 5.91	25.09 7.66	21.33 0.00	2.38	0.1214
07. % Gov. Budg.	1.75 0.39	1.48 0.21	1.35 0.55	0.89 0.31	1.69 0.00	1.59	0.0025
08. % Exp. Tec.	17.71 3.95	17.31 6.74	6.59 0.72	31.23 4.21	15.02 0.00	7.97	0.0037
09. % Empl. Tec.	7.18 0.16	6.04 1.06	4.55 2.29	3.90 3.57	10.98 0.00	3.26	0.0492

Table 3. Contd.

10. %Empl. Know	43.08 4.94	38.04 4.74	24.78 3.15	36.35 4.38	32.42 0.00	8.23	0.0033
11. EPO	251.25 3.60	150.133 42.62	28.64 32.00	127.60 95.18	271.14 0.00	10.87	0.0012
12. Tot Pat	1.752 0.609	3.334 2.727	1.338 1.971	0.159 0.105	22.043 0	19.86	0.0001
13. Pat Tec.	2.64 35.77	32.33 13.60	3.20 2.90	14.64 0.83	39.71 0.00	10.10	0.0015
14. USPTO	51.49 12.42	70.51 11.82	10.66 13.37	67.85 32.44	132.55 0.00	32.03	0.0000
15. %HRST	46.60 1.22	41.65 5.01	28.61 6.91	38.77 2.18	42.45 0.00	5.44	0.0137
16. EIS	0.63 0.04	0.53 0.04	0.37 0.01	0.53 0.01	0.58 0.00	24.67	0.0000
17. GCI	5.52 0.02	5.31 0.16	4.41 0.25	4.92 0.10	5.46 0.00	20.28	0.0001
18. IMD	78.75 5.25	74.34 6.86	51.97 4.96	81.03 4.79	74.74 0.00	12.74	0.0006

Source: Own preparation.

Table 4. ANOVA results for the variables of competitiveness.

Variable	F ANOVA	p-value
EIS	24.67	0.0000
GCI	20.28	0.0001
IMD	12.74	0.0006

Source: Own preparation.

Table 5. Clusters.

Leader	Follower	Mediterranean	Moderate	Germany
Finland	Austria	Spain	Ireland	Germany
Sweden	Belgium	Greece	Luxemburg	
	Denmark	Italy		
	France	Portugal		
	The Netherlands			
	United Kingdom			

Source: Own preparation.

On the second dimension, the variables of exports of high technology products and employment in high tech

sectors, the leaders are in the second position and slightly above average whilst with respect to the variable

Table 6. Summary of the analysis for 5 cluster.

Cluster	01 %Tot. Exp. R&D	02 %Tot. Exp. Bus	03 %Tot. Exp. Pub	04 Tot Research	05 %Emp. R&D	06 %Women	07 % Gov. Budg.	08 % Exp. Tec.	09 % Empl. Tec.
1	3.56	67.40	24.92	64,987	1.85	39.25	1.75	17.71	7.18
2	2.04	52.54	31.91	130,803	1.20	27.04	1.48	17.31	6.04
3	0.91	37.58	48.59	84,747	0.66	36.40	1.35	6.59	4.55
4	1.42	71.10	20.64	9,794	1.45	25.09	0.89	31.23	3.90
5	2.48	66.16	30.68	413,721	1.20	21.33	1.69	15.02	10.98
Total	1.89	53.91	33.84	112,473	1.17	30.52	1.41	16.20	5.84

Cluster	10 % Empl Know	11 EPO	12 Tot Pat	13 Pat Tec.	14 USPTO	15 % HRST	16 EIS	17 GCI	18 IMD	Tot. Pop.
1	43.08	251.25	1,752	82.64	151.49	46.60	0.63	5.52	78.75	7,241,706
2	38.04	150.13	3,334	32.33	70.51	41.65	0.53	5.31	74.34	22,111,033
3	24.78	28.64	1,338	3.20	10.66	28.61	0.37	4.41	51.97	31,683,477
4	36.35	127.60	0,159	14.64	67.85	38.77	0.53	4.92	81.03	2,442,567
5	32.42	271.14	22,043	39.71	132.55	42.45	0.58	5.46	74.74	82,217,837
Total	34.58	136.28	3,415	29.40	69.13	38.50	0.50	5.06	69.88	26,289,938

Source: Own preparation.

employment in knowledge-intensive services they are in the lead, with 43.08 and 24.58 % above average.

Looking at the third dimension, the study noted that the total number of European patent applications (a variable measured in absolute terms) is well below the European average and that of other groups; this result is obvious, as this group is formed only with small populations. However, if the other three variables were looked at, (measured in relative terms) related to patents, their results are above average and in particular, in European patents in high technology (82.64) and USPTO (151.49), they obtain values of 181 and 119% respectively, higher than the average for the EU-15. With regard to human resources in

science and technology (46.60), they obtain the highest rate, as expected, 21% above average.

Finally, in the dimension of competitiveness, they perform well above the other groups of countries in the EIS indicator, with 0.63 and 26% above average, in the variable, GCI, reaching 5.52, occupying the first position and in the IMD indicator, the leaders are located in second position and, better than the average of EU 15.

Followers

This group is formed by: Austria, Belgium, Denmark, France, Netherlands and the United Kingdom. Countries in this group follow the results

for the group leaders and Germany, both at the forefront of innovation, as shown by most of the 18 variables, and thus, the name of the conglomerate.

Looking in detail at the different variables, it was seen that this is consistently the case, except in two of them, (measured in absolute terms), because of population and size reasons: total number of researchers and total number of European patent applications. In fact, in these two cases, with figures of 130,803 and 3,334 respectively, this group would be in first place if not for Germany, whose case represents a separate cluster because of its special characteristics and will be studied later.

Examining the first dimension, research and

development, it is noted that while the followers are not positioned first in any of their variables, they are in second or third place in most cases, and always around the average values. Regarding the second, third and fourth dimensions, high technology and knowledge intensive services, patents and human resources in science and technology, the same can be said.

Finally, analyzing the results for the three variables within the dimension of competitiveness, followers are always behind the group leaders and Germany, but above the average of the results for the EU 15.

Mediterranean

This group includes Spain, Greece, Italy and Portugal. In general, these are the countries with poorer outcomes, with the exception of the two variables measured in absolute terms, because they are countries with a relatively high number of inhabitants. It is noted how in some of the variables. They are not placed in last place, as is the general trend (for example, in the percentage of women researchers, with a 36.40%, they fall in second place behind the leaders and a 19% higher than the average).

In the variables government budget for R&D and knowledge-intensive services, this is also the case, and with figures of 1.35 and 4.55%, they do not occupy the last position of the five groups.

It should be noted that they occupy the first place in percentage of total expenditure on R&D financed by the public sector, with 48.59%, which represents a figure, 44% higher than other European countries; other groups get much higher percentages of R&D expenditure financed by the business sector, unlike the Mediterranean's last place with a 37.58 and 30% below the average for the EU-15. This reflects the greater weight of the Administration in the Mediterranean group as opposed to other groups where the business sector prevails.

As a conclusion withdrawn from the analysis from the dimension of competitiveness, the Mediterranean countries perform the worst results for the five groups defined herein

Moderate

This group is made up of Ireland and Luxembourg. It shows an irregular behaviour of its variables, that is, while some of them are very well positioned, other variables are relegated to backward positions, and this is why they have been named moderates. The most relevant variables in this group are discussed further.

The percentage of R&D expenditure, financed by the business sector is the highest of the five groups with a 71.10 and 32% above average. By contrast, the percentage of R&D expenditure financed by the public

sector is the lowest at 20.64 and 39% below average. Accordingly, the percentage of government budget for R&D is the lowest of the five groups with a 0.89 and 37% below the average. These results contrast with those obtained in the Mediterranean group where the opposite occurred.

The total number of researchers and total number of European patent applications, with 9,794 and 0,159, respectively, is the lowest once again, due to the total number of inhabitants in each country. It is remarkable that the variable export of high technology products is 31.23%, which almost doubles the industry average. However, the percentage of employment in high-tech sectors is in last place with 3.90%.

Finally, with regards to the dimension of competitiveness, GCI and EIS show results above average, but it should be emphasized that they obtain the best result of the five groups in IMD, with 81.03.

Germany

It constitutes a cluster by itself due to a number of unique features. It is not unusual to get one or several clusters composed of a single individual from a sample population, and Porter (1980) advises of the validity of a situation such as the one presented here.

Germany is a country which includes cluster features in itself, and that overall, for most of the variables, is very well positioned and above the average for the EU-15.

Through innovation, in strategic planning and manufacturing processes in the last 20 years, Germany has achieved an increase of 100% of GDP with a reduced consumption of basic energetic resources of 27%. This has enabled the country to obtain a strategic advantage which, in turn, has encouraged others to follow the path of innovation and operational efficiency and has led to the creation of innovation clusters along the way (Federal Ministry of Economics and Technology, 2009; the International CHP / DHC Collaborative, 2009).

It performs well above the others in total number of researchers and total number of European patent applications with 413,721 and 22,043, respectively, partly due to being the country with the largest population surveyed, over 82 million inhabitants, but also to its innovation capacity. Thus, it leads in the following variables: employments in high-tech sectors with 10.98% ahead of the other groups and almost doubling the average; with regards to patents, the EPO variable (271.14) also occupies the first position, doubling the average. These results show Germany strength in the dimensions of high technology and knowledge-intensive services and patents, where the difference from the rest of the groups is remarkable. Similarly, the EIS, GCI and IMD variables are above the average.

Finally, analyzing the different features of each group, the dendrogram in Figure 1 shows the grouping of the

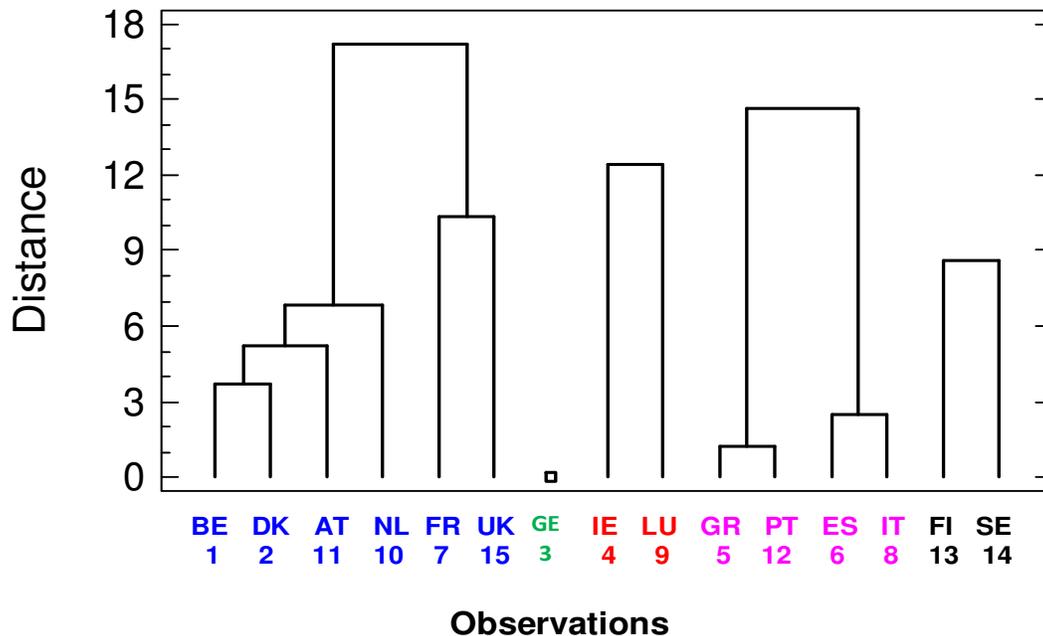


Figure 1. Dendrogram (Source: Authors' preparation).

BE, Belgium; DK, Denmark; AT, Austria; NL, Netherlands; FR, France; UK, United Kingdom; DE, Germany; IE, Ireland; LU, Luxembourg; GR, Greece; PT, Portugal; ES, Spain; IT, Italy; FI, Finland; SE, Sweden

different countries within each cluster, reflecting the composition of the clusters and the distance among them. This figure summarizes the grouping process for the cluster analysis and indicates how similar objects connect with each other through linkages whose position in the diagram is determined by their level of similarity/dissimilarity.

The horizontal axis represents the observations (countries) and the vertical axis shows the distance, lower values indicating higher similarity among observations and higher values indicating minimum similarity. Table 7 shows the grouping of the observations: the observations which are closer to each other (distance closer to zero) belong to Greece and Portugal (1.21422), followed by Spain and Italy (2.46602), they all form the clusters of Mediterranean countries.

Most distant observations (farther from zero) belong to Belgium and France (17.2306); these observations group with Denmark, Austria and Netherlands in the first case and with the United Kingdom in the second case, they all belong to the Followers cluster. The cluster formed only by Germany is represented by a dot in the dendrogram with distance equal to zero.

In summary, the Mediterranean cluster shows the highest homogeneity among variables, whereas, the cluster with higher heterogeneity is the Followers group, due to its larger size (6 countries). Once the five clusters have been analysed, it is interesting to review Figure 2.

The study can observe that the 15 countries form

homogeneous groups, countries of the group leaders and Germany being located in the upper right of the diagram, correspond with the highest values of these three variables (IMD, GCI, EIS), that is, being the most competitive.

In contrast, the group of Mediterranean countries are at the bottom left of the diagram, where the values of the three competitive variables are lower. The countries in the Followers group are located just to the left to the Leaders and Germany, "following" them, as indicated earlier. And finally, the study finds the two "moderate" countries around the centre of the diagram, as expected in a moderate or intermediate position. The message that emerges from this graph is the groupings of countries in these clusters based on the three variables of competitiveness: EIS, GCI and IMD, showing the direct relationship between the most technological innovative countries and their levels of competitiveness.

Conclusions

The present study presents an empirical analysis for classifying countries in the EU-15 into clusters which show a homogeneous competitive and innovative behaviour. Competitiveness differences among clusters and the countries included therein are explained through topological analysis of each group.

To this end, the study used 18 variables related to the

Table 7. Agglomeration schedule.

Stage	Clusters combined		Coefficient	Stage first appears		Next stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	5	12	1.21422	0	0	9
2	6	8	2.46602	0	0	9
3	1	2	3.71929	0	0	4
4	1	11	5.23726	3	0	5
5	1	10	6.85712	4	0	10
6	13	14	8.5949	0	0	0
7	7	15	10.3587	0	0	10
8	4	9	12.4339	0	0	0
9	5	6	14.6805	1	2	0
10	1	7	17.2306	5	7	0

Clustering method: Ward's; Distance Metric: Euclidean (source: own preparation).

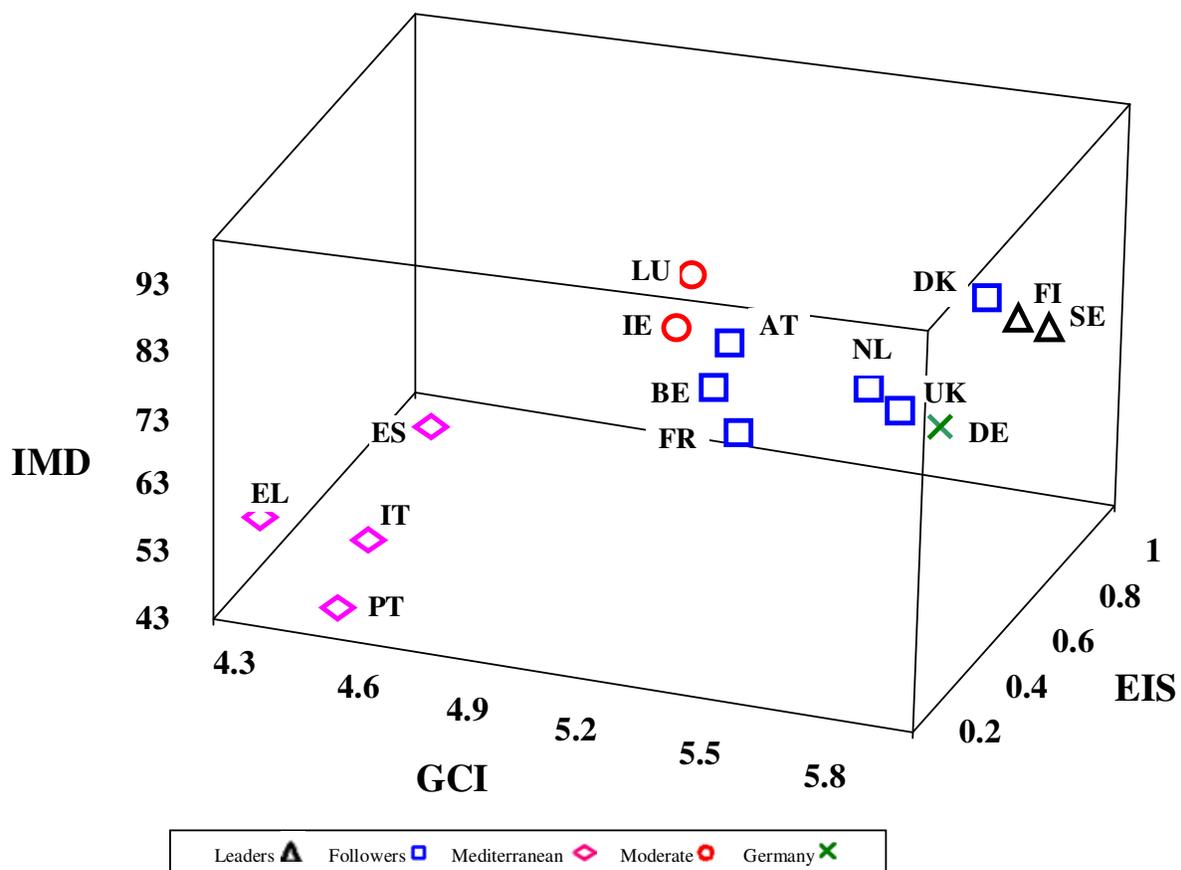


Figure 2. Competitiveness diagram (source: own preparation).

technological innovation capacity and competitiveness for the period 1998 to 2008. Through a widely used statistical system, - cluster analysis - the study examined the characteristics of the groups obtained. The usefulness of this methodology lies in being able to analyze the competitive structure of the EU-15, treating these groups of countries

as one entity and facilitating the study and definition of convergence strategies.

The results reveal the existence of five distinct clusters characterized by different levels of technological innovation and competitiveness that the study has named: Leaders, Followers, Mediterranean, Moderate and

Germany. It can also be observed that countries grouped into clusters that perform better in technological innovation capacity in each of the analyzed variables, lead to higher levels of competitiveness for these countries, measured through the variables: EIS, GCI and IMD. As regards the theoretical interpretation of the empirical findings and their implications, first and foremost, from the perspective of the literature on innovation, it can be said that the results provide new evidence of the existence of five different clusters of countries grouped according to variables related to competitiveness and innovation capacity. Secondly, it seems clear that differences between countries are well reflected by the cluster analysis.

The study encourages the opening of new lines of research. In this regard, it poses the following questions:

- i. How have countries changed from clusters during the period studied?
- ii. How many of the countries who directed their efforts to jump to a higher group succeeded?
- iii. Did any of these countries not just remain within their cluster, but fell to a lower cluster?

From the basis of this study, further investigation, for which a year on year analysis would be invaluable, was recommended.

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Full Length Research Paper

Students' perceptions about institutional transformation at the University of the Free State

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The importance of managing transformational change led to the need to identify some critical issues in a university context. In view of the substantial transformational change that has already taken place at the University of the Free State, it is important to consider how the students perceive transformational change. In this quantitative study, a survey using a convenience sample of students residing in hostels showed that they were generally positive about the change taking place at the university. No significant difference was found with regard to differences in perception in terms of gender and race groups. Significant differences were however found with regard to the number of years studying at the University of the Free State. It is suggested that this study be followed up by a qualitative study to provide in-depth insight into students' attitudes and perceptions. Identification of student perceptions through research will help to guide management in transformational change processes.

Key words: Change management, institutional transformation, student perceptions.

INTRODUCTION

The University of the Free State (UFS) with its main campus in Bloemfontein is a multicultural, parallel-medium (English and Afrikaans) institution. The two other campuses are the Qwaqwa campus in the Eastern Free State and the smaller South campus in Bloemfontein.

With the appointment of Prof. Jonathan Jansen as Vice-Chancellor and Rector on 1 July 2009, the university entered a new, dynamic era. He is not only determined to lead the institution to become one of the best universities in the world; but he also wants to distinguish the university from other universities and to transform the university. In this regard is the creation of the International Institute for Studies in Race, Reconciliation and Social Justice at the university an excellent example of the seriousness about the complex and challenging work of social transformation at the UFS (<http://www.ufs.ac.za/content.aspx?id=97>).

On a question asked on why only some South African universities get globally ranked, it was answered that the colonial attitude adopted during the apartheid years plays

a role and that there is no doubt that South African higher education will face the same challenges that other African countries face (<http://www.timeshighereducation.co.uk/world-university-rankings/2010-2011/africa.html>). Change is thus an important requirement for the UFS to achieve the dream of the UFS to become one of the best universities in the world and to be ranked as such.

The UFS has been lauded by the former South African president, Mr. Nelson Mandela, as the leader in the transformation process in higher education in South Africa (www.sastudy.co.za/index.php?option=com_content&view=category&layout=blog&id=81&Itemid=138). The UFS has also received international recognition for its efforts in institutional change. In 2005, the Council of the UFS appointed the Transformation Plan Task Team with the purpose of improving its performance and its reputation through adapting to a new culture or new ways of doing things. One of the areas targeted in this transformation plan is the institutional culture, which includes the institutional climate, the sense of belonging, student life, staff life and the language policy. The focus of this study was to determine how changes affect student life. Change at the university was evident in different areas and was especially emphasized after increasing pressure to speed up the transformation process after some racial

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incidents at the university. The challenge for the UFS is to make a meaningful contribution to the pursuit of greater social cohesion and equity not only for the university community, but also for the country. According to Wren and Dulewicz (2005), organizations around the world are undergoing significant changes that must be confronted in order to survive. This may be truer for South African universities, because the question on how institutions of higher education in South Africa should translate the broad policy guidelines into institutional transformation, remains one of the central themes within the debates on transformation in the higher education (Kulati, 2003). Creating readiness to change requires change managers or change agents to minimize resistance. Furthermore, change recipients need to be motivated to be change agents while delivering the change message that will facilitate the adoption of the relevant or appropriate behaviours. These behaviours are indispensable for the effective execution and implementation of the change initiative (Neves, 2009). For change in institutional culture to take place, the management of any institution should ensure that everyone in the organization understands his or her role – both during and after the change process (Holloway, 2002). Changing recipients' participation has become a fundamental aspect of organizational change and is central to increasing the likelihood of sustainable change (Armenakis and Harris, 2009). The announcement of the desired institutional change does not mean that all the organizational members (staff and students) will automatically be receptive to it or that they will be ready to move forward in implementing it. Senior management cannot necessarily direct employees and students to abandon the old ways and take up new ones. Therefore, they also cannot expect the required actions and changes to occur in a rapid fashion and lead to the desired outcomes (Hough et al., 2008). Some members and students of the organization may not be convinced of the merits of change. Students may perceive change as being contrary to the organization's best interest or as threatening student life as it was commonly accepted and perceived. Although, much change and transformation has already taken place, the question can still be asked: "How do the students of the UFS perceive transformational change?" The UFS students' perceptions about transformational change at the university need to be determined. Through identifying the students' perceptions, it will be possible to determine where to focus interventions to facilitate a change of perceptions so that transformation can continue. A positive perception would ensure that transformation can continue to be implemented successfully as far as student life is concerned, because it would indicate a level of readiness that is an important factor – one that can have a significant impact on the process and success of the implementation of cultural transformation. The purpose of this article is to explain the importance of institutional change and some issues that influence change. The students' perceptions of transformational change

at the UFS were determined through the use of various statistical analyses.

LITERATURE REVIEW

In today's dynamic world, competition is harsh and little mercy is shown in the organizational environment. Consequently, institutional leaders are forced to constantly plan for the future so as to prepare their institutions for many unforeseen circumstances and the rapid change that might occur as a result of the competitive environment. A few negative incidents that necessitate transformation occurred at the university. To emerge as a market leader or to remain competitive depends on change efforts that drive organizational innovation. According to Armenakis and Harris (2009), the answer lies in the organizational leader's ability to be vigilant about the context in which their organizations are situated and being particularly attentive to the changes in the general and task environment. The emphasis on institutional change within the higher education dispensation has emphasised the role of leadership and particular that of the vice-chancellor and rector at the centre stage of institutional change agendas (Kulati, 2003).

To survive and prosper, institutional leaders must be knowledgeable about how to effectively implement appropriate organizational changes that will be adopted and embraced by all affected. An important aspect is to allow institutional members to participate in the change efforts, because that can enhance their sense of discrepancy and make it more likely for appropriate change to be selected (Armenakis and Harris, 2009). By enabling change recipients to participate in change efforts, valence is enhanced by allowing them to select the appropriate changes that they feel they will be able to accomplish. Generally speaking, change recipients' participation increases the likelihood that sustainable change management can be accomplished (De Caluwe and Vermaak, 2004).

The most significant aspect is that the survival of any change depends on the change recipients' ability to adapt and acknowledge the change that is likely to affect them. Change recipients' attitudes towards change play an important role. Since all change needs to be implemented by the recipients, understanding the underlying reasons behind their motivations to support change provides practical insights about how to lead change effectively (Armenakis and Harris, 2009). Students' understanding of the need and requirements for transformational change is fundamental in successful transformational change at any institution of higher education.

In response to the new culture, new strategies, changing labour forces, new technologies and changed organizational structure, most organizations and their members are finding it very applicable and acceptable to engage in a change initiative so as to remain competitive (Allen et al., 2007). Despite this, most organizations have

been found to struggle with the process of being more receptive to the process of change. According to Balogun and Hailey (2004), Burns (2004) and Higgs and Rowlands (2005), up to 70% of change initiatives often fail. These failures could be attributed to a number of factors, including the organizational members' tendency to display resistance or the fact that people are not even certain about the importance of and the requirements for change. Other factors that might influence the failure to effect change failures could be the managers' inability to understand the change process, their inability to motivate their organizational members to participate in the change process, their inability to create readiness for change, their inability to align all necessary organizational functions towards change objectives as well as the lack of appropriate approaches towards the change process (Allen et al., 2007).

People's reactions to change can differ significantly; that is, instead of recognizing change benefits, they might just change because they fear the costs of not doing so and as a consequence exhibit behaviours such as boycotting the change efforts (Neves, 2009). The more positive feelings people have towards their ability to cope with change, the more they will believe that change is beneficial to them as well as to the organization in general. Effective commitment is therefore a positive manifestation of organizational members' attitudes towards change and it can significantly influence the successful implementation of change at any level.

The truth is that even if the organization has change agents (or institutional leaders) who might possess every necessary competency or skill required to ensure the effective implementation of strategies, change recipients themselves may be the basic reason for change initiative failures, because of their response or reactions towards change initiatives (Fox et al., 2007). During organizational restructuring or change, organizational members are often faced with some unique workplace stressors coming from outside their roles and tasks. They may thus show affective, cognitive and behavioural reactions towards the change process (Allen et al., 2007). Constant monitoring of change recipients' attitudes during the implementation process remains an important requirement for institutional leaders, because it will have an effect on the way forward. The question may be: should implementation carry on in the same manner, or is change needed in the transformation plan?

Some recipients may be uncertain about the reasons for change, while others could significantly resist the process of change. Uncertainty refers to an individual's inability to predict a situation accurately. It can be attributed to a number of factors including ambiguous as well as contradictory information. Regardless of the nature of the situation, uncertainty has always been regarded as an undesirable situation by organizational members that encourage them to engage in coping strategies aimed at reducing negative perceptions to the situation. During the

process of change, when individuals experience uncertainty, they are therefore motivated to seek relevant information that will enable them to reduce this uncertainty (Brashers, 2001).

Uncertainty management can be proposed as the most relevant alternative for reducing uncertainty. According to Allen et al. (2007), uncertainty management theory does not only define uncertainty as a negative state, but also for some individuals, uncertainty may be seen as a positive state. This simply means that information-seeking behaviour can be used to reduce uncertainty behaviours or to increase hope or optimism (Brashers, 2001). Uncertainty can provide a sense of hope and optimism regarding the pending outcome, rather than the certainty of a negative outcome. In contrast, most of the researchers (Brashers, 2001; Bordia et al., 2004) have demonstrated that uncertainty seems to be the major consequence of change processes in organizations.

During the process of organizational transformation, members are more likely to experience uncertainty in relation to a range of different issues such as, the reasons behind change, the process of execution and implementation and the anticipated outcomes of change (Bordia et al., 2004). In addition, research has also demonstrated that organizational members could experience uncertainty with regard to the security of their position, their future responsibilities, as well as their roles. As a result, organizational change proves to be a major stress factor in terms of which organizational members will be seeking some prediction and understanding of the occurrence of the events so as to minimize their own uncertainty (Allen et al., 2007). The role of communication in ensuring that everyone understands the change process is therefore an important issue.

The success of any organizational change process depends largely on organizational leaders' ability to communicate the requirements, implications and the advantages of being adaptive as well as receptive to change (Fox et al., 2007). Even though there is a general agreement that communication provides a vital component of a successful implementation, some strategies formulated by management still seem to fail to achieve the organizational goals. Evidence has indicated that during most change processes employees are often left with uncertainty and consequently find themselves trying to alleviate this uncertainty by seeking information to reduce it. Several studies conducted by different researchers have illustrated that change communication can facilitate openness and a positive attitude towards the change initiative to the extent that the employees' uncertainty is addressed effectively (Bordia et al., 2004; Armenakis and Harris, 2009). If communication is seen to be the most powerful medium, the change recipients tend to develop trust in the change agents (Allen et al., 2007).

When organizations introduce or implement change, people usually respond at various levels, demonstrating cognitive, affective and/or emotional responses (Smollan,

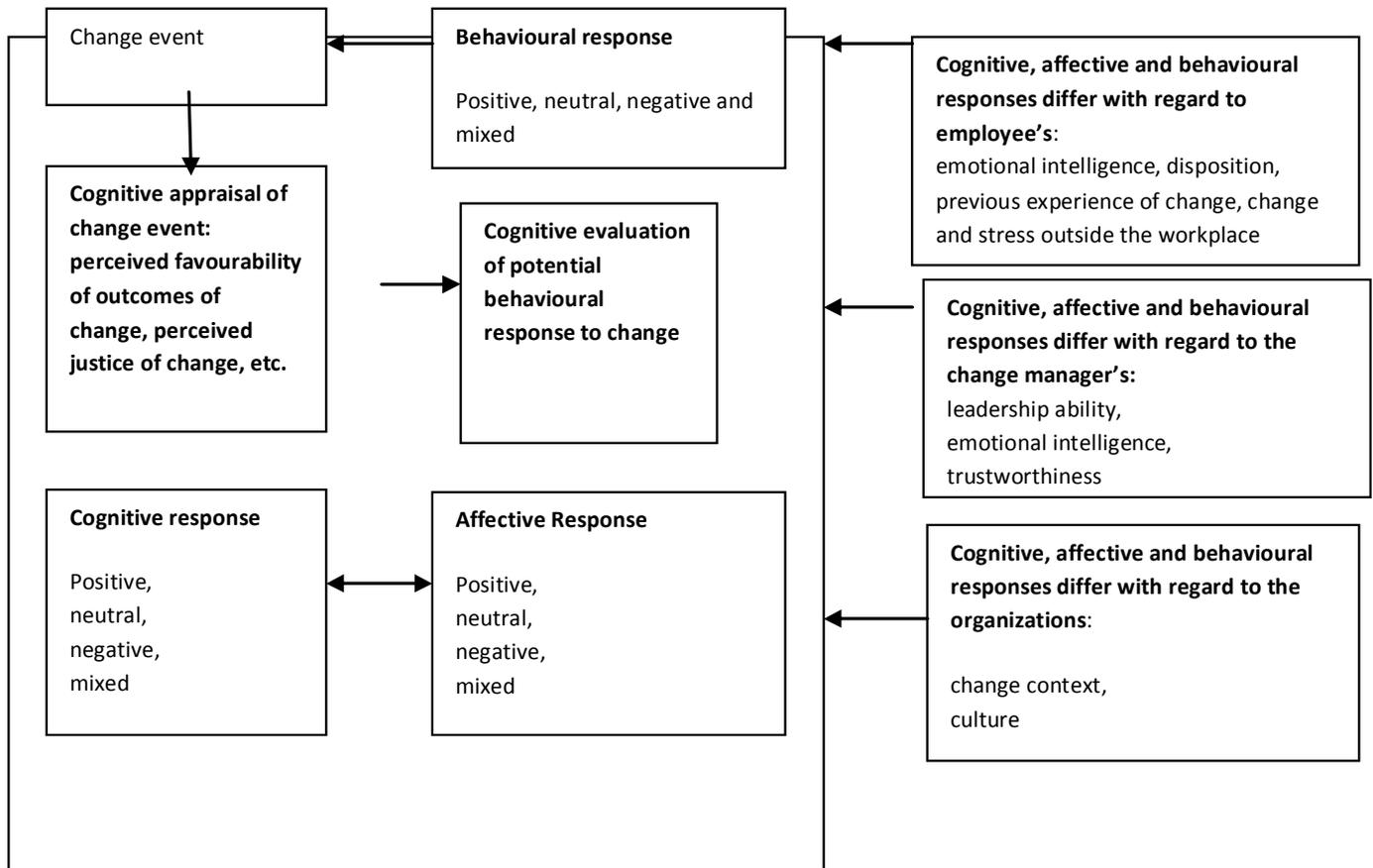


Figure 1. The model of response to organizational change (Smollan, 2006).

2006). During this process the organizational management will hope that all organizational members will comply with the efforts of change and passionately show support for change with appropriate actions (Piderit, 2000). According to Smollan (2006), when management introduce or communicate the need for change, they must make sure that they get the support of the hearts and minds of the change recipients to ensure successful implementation. According to Fisher and Ashkanasy (2000), a number of researchers in the field of organizational behaviour have criticized the neglect of emotion. The study of organizational change has also been criticized for excluding the affective domain and focusing on the cognitive and behavioural domains only (Basch and Fisher, 2000). That is why the emotional and personal impact of transformation is important in any analysis of the perception on transformational change and has been included in this research. The behavioural domain is however the function of cognitive and emotional processes. Figure 1 illustrates the nature of people's responses and the factors affecting those responses.

Figure 1 indicates that the process of change in an organization simply triggers cognitive responses that are affected by the perceptions of how favourable the change

outcomes are. Furthermore, cognitive responses are influenced by affective responses, whether positive, neutral, negative, or mixed (Piderit, 2000). In addition, before the behaviour could occur, people often consider the implications of behavioural choice. According to Piderit (2000), cognitive, affective and behavioural responses are triggered by individual factors within the person himself or herself, such as emotional intelligence, disposition, previous experience of change, change and stressors outside the workplace, factors in the change manager's leadership style, emotional intelligence and trustworthiness, and the factors within the organization such as the culture and the context of the organization. This model is regarded as the most applicable model for most change events, even though the nature of change processes will affect employees in different ways (Smollan, 2006).

The literature suggests that throughout the implementation process, it is important to have a good understanding of the organizational members' perceptions of the transformation process. Although no specific previous research could be found on what factors can influence the perceptions of students on transformation, it was assumed in this exploratory research that the perceptions

Table 1. Variables tested with regard to perception about transformation.

Requirement for transformation/change
1. Change brings about new challenges in the students' lives.
2. Students have the mental capacity to make the necessary changes in their lives as students.
3. The university authorities have the necessary skills to manage their students through the change initiatives
Motivation for transformation
1. Students are looking forward to the outcomes of change initiatives.
2. Students are committed to achieve the objectives of the change initiatives.
3. Students are of the opinion that the change will improve the university's performance.
4. Students perceive change as beneficial to them as students.
Personal impact of transformation
1. Students believe that the anticipated change will affect them as students.
2. Students believe that the anticipated change will have positive effects on their academic performance.
3. Students believe that they have the ability to cope with the change initiatives.
4. Students talk openly about their fears associated with the change initiatives.
Emotional impact of transformation
1. Students view change initiatives as being fair towards all students.
2. Students feel resentment towards the University for insisting on change initiatives.
3. Students feel that their loyalty towards the university is being considered in change initiatives.
4. Students believe that the change initiatives will be different from the previous unsuccessful efforts.
5. Students believe that some of the students are rejecting the change initiatives completely.
6. Students view the required changes as additional stress factors in their lives as students.
7. Students experience no problems to understand the required change.
8. Students feel that their fellow students react positively towards the anticipated change.

of students will primarily be influenced by their gender, race and different levels (years) of study. These are also determining factors in terms of social and educational stratification. Accordingly the following hypotheses are proposed:

H₁: Students are positive about transformation.

H₂: There is a significant difference between male and female students with regard to their perception about transformation.

H₃: There is a significant difference between students of different races with regard to their perception about transformation.

H₄: There is a significant difference between students of different levels of study with regard to their perception about transformation.

RESEARCH METHODOLOGY

In June 2010, a survey was conducted among students residing in all the junior hostels on the campus of the UFS. In total, a convenience sample of 168 (5.67% of the sample frame population of 2960 students in junior residences) usable questionnaires, were collected. Since the hostels at the UFS are integrated, there was no fear that the respondents would not meet the criterion of diversity.

The survey items with regard to the perception about transformation were measured on a five-point scale, ranging from "strongly agree" (5) to "strongly disagree" (1). The four variables of this section measured the students' perception of; (1) requirements for transformation, (2) motivation for transformation, (3) personal impact of change and (4) emotional impact of change. Table 1 gives an indication of the various statements in terms of the four variables. The survey included 37% male and 63% female students. Black students represented 34%, coloured students 6%, white students 56% and Indian students 4% of the total sample. In terms of the students' level of years of study, first-years represented 50%, while second- (22%), third- (19%) and fourth-year (9%) students made up the remaining part of the study.

RESULTS AND TESTING OF THE HYPOTHESES

The overall score in terms of the attitude towards the four variables that determined the students' perception about the process of transformation and change at the UFS was 3.35. This is just above the average and is positive. With regard to the variable whether they do have the necessary requirements to change, the result was an average of 3.60. In terms of their motivation to change, they scored 3.31. The respondents' response with regard to their perception about the personal impact of transformation was an average of 3.55. The perception about

Table 2. Means and standard deviations for gender, race and year of study.

Variable	f	Variable	Transform	Motivation	Personal	Emotional	Total
Gender							
Male	62	Mean	3.5868	3.3120	3.4560	3.0178	3.2618
		Std deviation	0.5716	0.9488	0.4528	0.4078	0.4557
Female	106	Mean	3.6044	3.3116	3.6093	3.1886	3.3689
		Std deviation	0.5738	0.9261	0.5182	0.4572	0.4851
Race							
Black	57	Mean	3.7248	3.5043	3.6087	3.1498	3.4130
		Std deviation	0.6477	0.9758	0.5923	0.5471	0.5519
Coloured	10	Mean	3.8325	4.1500	3.6000	3.0556	3.5341
		Std deviation	0.6363	0.5972	0.3652	0.1434	0.3368
White	94	Mean	3.5261	3.1737	3.5368	3.1404	3.2907
		Std deviation	0.4884	0.8589	0.4676	0.4131	0.4316
Indian	7	Mean	3.5700	2.5000	3.2800	2.8533	2.9409
		Std deviation	0.9475	1.2728	0.1414	0.0786	0.4178
Year of study							
First	84	Mean	3.7838	3.5294	3.6882	3.2647	3.492
		Std deviation	0.4983	0.7861	0.5261	0.4360	0.4339
Second	37	Mean	3.512	3.3467	3.3333	3.1037	3.2667
		Std deviation	0.5756	0.9054	0.4761	0.4685	0.4931
Third	32	Mean	3.3331	3.1846	3.4308	2.9658	3.1713
		Std deviation	0.5445	0.8697	0.4231	0.3778	0.3968
Fourth	15	Mean	3.3333	2.2667	3.6000	2.7407	2.9091
		Std deviation	0.7303	1.2879	0.3347	0.2400	0.4904
Total		Mean	3.5979	3.3118	3.5529	3.1258	3.3295
		Std deviation	0.5688	0.9275	0.4973	0.4444	0.4740

the emotional impact of change received the lowest score, which is, 3.13.

H₁: Students are positive about transformation

No specific statistical analysis was used to verify Hypothesis 1. The fact that the average for each of the four categories as well as the overall average was above 3.00 (indication of neutrality) indicates that students were positive about the change and transformation that was taking place with regard to their student life. Table 2 shows the results in terms of gender, race groups and the different year groups.

It was evident from these results that first-year students were more positive than more advanced students.

Students in their fourth year of study were negative in terms of their overall perception. It is also clear that students' perception regarding their emotional readiness for transformation was lower than for the other issues.

H₂: There is a significant difference between male and female students with regard to their perception about transformation

A t-test was used to test Hypothesis 2. A t-test determines if two statistical variables are equal or not. The null hypothesis in terms of the second hypothesis is: "There is a no significant difference between male and female students with regard to their perception about transformation." Levene's test was used to test equality of

Table 3. Testing of hypothesis 2.

Statistics		Levene's test for equality of variances				
		F	Significance	t	P	Mean difference
Transform	Equal variances assumed	0.274	0.602	-0.122	0.903	-0.01762
Motivation	Equal variances assumed	0.078	0.781	0.002	0.999	0.00037
Personal	Equal variances assumed	1.159	0.286	-1.23	0.223	-0.1533
Emotional	Equal variances assumed	0.929	0.339	-1.544	0.127	-0.17085
Overall	Equal variances assumed	0.646	0.424	-0.897	0.373	-0.1071

Table 4. Testing of hypothesis 3.

Statistics		Sum of squares	Mean square	F-value	P
Transform	Between groups	1.507	0.377	1.177	0.330
	Within groups	20.168	0.320		
Motivation	Between groups	6.697	1.674	2.071	0.095
	Within groups	50.933	0.808		
Personal	Between groups	0.343	0.086	0.333	0.855
	Within groups	16.227	0.258		
Emotional	Between groups	0.268	0.067	0.326	0.860
	Within groups	12.964	0.206		
Overall	Between groups	0.943	0.236	1.053	0.387
	Within groups	14.108	0.224		

variances. This test helps to determine which t-test to use: the one that assumes equal variances or the one that does not assume equal variances for each category.

Levene's test identified the t-test with the equal variances assumed as the appropriate test to analyse the statistics. The statistic in terms of the difference between male and female is presented in Table 3.

The difference between male and female perception on all four variables individually as well as the overall perception about the process of transformation and change, is not statistically significant ($p > 0.05$). Therefore, the null hypothesis can be accepted that there is no significant difference between male and female students with regard to their perception about transformation.

H₃: There is a significant difference between students of different race with regard to their perception about transformation

Analysis of variance (ANOVA) is the statistical method used for making the simultaneous comparison between two or more statistical variables, and helps in determining whether the equality exists between these variables. The ANOVA test was conducted to identify the equality between race (H₃) and years of study (H₄) as independent

variables and the students' perception about transformation at the UFS as dependent variable.

The null hypothesis for H₃ was: "There is no significant difference between students of different races with regard to their perception about transformation." The difference between the different race groups for all four categories individually, as well as the overall perception about the process of transformation and change, was not statistically significant ($p > 0.05$). The null hypothesis for Hypothesis 3 was accepted. However, on a 90% significance level, there was a significant difference between the different race groups' perceptions with regard to the motivation for change (Table 4). The perception of the different races with regard to motivation for change is given thus: Blacks 3.50, Coloureds 4.15, Whites 3.17 and Indians 2.50. The difference between Coloureds and Indians is quite obvious. It is clear from this results that the Indian students experience a negative perception in this regard, while the other three groups are positive.

H₄: There is a significant difference between students of different levels of study with regard to their perception about transformation

The null hypothesis for H₄ was: "There is no significant

Table 5. Testing of hypothesis 4.

Statistics		Sum of squares	Mean square	F-value	P
Transform	Between groups	2.618	0.873	2.930	0.040
	Within groups	19.057	0.298		
Motivation	Between groups	8.392	2.797	3.636	0.017
	Within groups	49.238	0.769		
Personal	Between groups	1.553	0.518	2.206	0.096
	Within groups	15.016	0.235		
Emotional	Between groups	1.886	0.629	3.545	0.019
	Within groups	11.346	0.177		
Overall	Between groups	2.342	0.781	3.932	0.012
	Within groups	12.709	0.199		

difference between students of different levels of study with regard to their perception about transformation.” The difference between the different groups of students with regard to their years of study in terms of their overall perception about the process of transformation and change was statistically significant ($p < 0.05$). The null hypothesis for H_4 has been rejected (Table 5).

There was no statistical difference (on 95% significance level) between the different groups of students with regard to their years of study in terms of their perception about the personal impact of change ($p > 0.05$). On a 90% significance level, there was however, a difference ($p < 0.1$).

It is obvious that students in different years of studying experience significant differences in respect of their overall perception about transformation (Table 2). It is especially the fourth year students who were negative about the motivation for transformational change (2.27) and who experienced a negative emotional impact of change (2.74). It is also noteworthy that the other three year groups scored lower on the emotional impact of change in comparison with the other three variables. Third year students had a negative perception in terms of the emotional impact of change (2.97). This clearly calls for some intervention from student leadership to prepare students emotionally for transformational change.

Conclusions

The primary objective of this study was to determine the students' perceptions about the transformation process that is taking place at the University of the Free State (UFS) and to identify whether there are any significant differences between some independent variables and perception as dependent variable. Change was especially

emphasized after more and more pressure to speed up the transformation process after some racial incidents at the university. It was however stated that students might perceive change as contrary to the organization's best interest or threatening their student life as it was commonly accepted and perceived.

In this article, it was argued that transformation was essential at the UFS, especially after a few negative racial incidents took place at the university. It was also noted that it is difficult in any organization to manage and implement change. The successful implementation of change depends to a large extent on the perception of members of the organization. Failure to implement change strategies and transformation can be attributed to a number of factors. An important factor is organizational members' tendency to display resistance, or their uncertainty about the importance and requirements for change.

According to the data analysis and interpretation of results, it is clear that in general, the students of the University of the Free State are positive about transformation. The variables that were used to identify their perception about transformation were transformation requirement, motivation for transformation, personal impact of transformation and emotional impact of transformation. Furthermore, because lack of motivation towards transformation was assumed in this study to be caused by students' uncertainty about the advantages, implications or outcomes of transformation, it is recommended that a future study focus more specifically on students who are at second- to fourth-year level of studies. The reason is that, compared to the first-year students, these students have already experienced the university life and they are in a better position to understand what transformation entails.

It was evident from the data analysis that there were no significant differences between male and female students

and the different race groups with regard to their perceptions about transformation. It can be postulated that these students are positive about the continuation of transformation at the UFS. The lower results in terms of emotional impact of transformational change on students should however be addressed. All the race groups scored lower on this variable. Although students understand the need for change, the emotional impact of change is an area of concern and possible intervention.

Management needs to realize that in today's dynamic world, almost everyone in an organization can find solutions to the problems they and their organization encounter. In this respect management is encouraged to promote lateral leadership, which according to Kühl et al. (2005), entails a strategy to reach a shared understanding of what must happen. Leadership must instil trust in the students, since this will motivate them to take part in the process of transformation and to perceive transformational change as being positive.

The leadership, appointed by management, must be aware that the transformation process depends largely on their ability to communicate change requirements, implications and advantages. Management must also make sure that the leadership they appoint is equipped with the necessary resources so as to increase their ability to communicate and instil trust. Furthermore, management must ensure that all students understand the essence of transformation. This is only possible through effective communication.

While the authors are aware of their limited capacity to provide meaningful advice to institutional leaders about change and transformation, this article has highlighted the importance of students' perceptions as an important aspect in the implementation of transformation. Despite the positive view of leaders in South Africa, the younger generation argue that they were not part of past inequalities or the previous political dispensation, but they have to pay the bill for something they did not purchase. That might be why high positive perceptions were not found. This may perhaps also be the reason for the low scores on emotional impact of transformational change.

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Full Length Research Paper

Are IPOs (Initial Public Offering) still outperforming the market? Evidence from Spain in the period 2000 to 2010

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This paper analyzes the profitability of Spanish IPOs (initial public offering) in the period 2000-2010 both in absolute terms and relative to the IBEX (International Business Exchange) network in two specific moments: one in the short term, one month after the first trading day, and another one that could be considered as medium term, one year after the company goes public. The results show that 18 of the 38 companies surveyed (47.8%) obtained lower values than those of the IBEX one month after the IPO, being the performance of the stock price independently of the IBEX very similar (50% of negative events). Taking as reference the year after the date of the IPO, the result obtained is slightly different: while the comparison ratio with the IBEX as a benchmark is maintained at the same level (47.8%), the ratio of independent performance rises to the value of 60.5% of firms with negative returns. After analyzing these results, it can be said that the Spanish IPO outperform slightly the rest of the market in the short term, but this good performance is gradually diluted to the point that a year later more than half of the analyzed companies lose that outperformance, which becomes underperformance.

Key words: Stock market, IPO (initial public offering), under pricing, performance, after market orders, equities, IBEX (International Business Exchange) network.

INTRODUCTION

There are many studies, both internationally and nationally, about the relative profitability of public offerings with respect to the benchmark in each market. However, the conclusions they reach are not always homogeneous, as the final results depend on many different factors, such as the chosen sample, the method used, the explanatory variables of behavior, etc.

The following is a summary about the most important conclusions reached in recent years in this regard, in order to provide a wide horizon in which to situate the subsequent analysis of the profitability of IPOs in the Spanish market in the period 2000-2010. Most previous studies have found good initial returns in the short term for the IPOs (initial public offering), in markets such as the United Kingdom (Loughran et al., 1994), Germany

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(Ljungqvist, 1997), Switzerland (Kunz and Aggarwal, 1994), Finland (Keloharju, 1993), Japan (Jenkinson, 1990), Malaysia (Dawson, 1987), Mexico (Aggarwal et al., 1993), Thailand (Wethyavivorn and Koo-Smith, 1991), Turkey (Kiyamaz, 2000), Greece (Kasimati and Dawson, 2005), etc. The average returns, however, differ greatly from each other's countries, from 9.2% of the German case to 166.6% of the Malaysian IPOs. With regard to long-term profitability, however, most studies to date argue that the IPOs have a negative return. These are indicated by Ljungqvist (1997) and Stehle et al. (2000) for Germany; Levis (1993) and Keasey (1992) for the UK; Aggarwal et al. (1993) for Brazil; Keloharju (1993) for Finland; and Uhlir (1989), Ritter (1991), Loughran and Ritter (1995) and Brav and Gompers (1997) for the United States, all for periods of between three and five

years. However, there are also those who have not found evidence of negative returns in the long run, as Kasimati and Dawson (2005) for the case of Greece and Loughran et al. (1994) for Sweden.
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It is convenient to analyze the factors that have traditionally been considered relevant to explain the long-term behavior of the public offers. In this regard, Gonenc and Doukas (2003) contradict some previous studies in which it was said that there was a high correlation between the reputation of the investment banks engaged in the IPO and its long-term results. Using a sample of 456 IPO from January 1, 1989 until December 31, 1994 of the IDD Review of Investment Banking published by Investment Dealers' Digest, they demonstrate that the relationship between the reputation of banks and the results of OPV is negligible, since all of them, regardless of such a reputation, have obtained results slightly below their benchmarks for the first two years of trading. Similarly, they conclude that venture capital does not significantly influence the results of the IPO, since if this is related to the operating results of companies that go public, companies with the most reputable investors should get better results, which is not shown in the analysis. Finally, they state that previous studies have overestimated the role of financial investors since the results of the companies surveyed are similar to those of other companies of similar size or value of balance in the same industry.

Ritter (1991) studied the low long-term profitability (in the first three years of trading) of the shares of companies that had conducted an IPO versus those that had not, concluding that this low profitability was due to the reason that many companies went public in conjunction with the existence of a short-term interest in certain sectors, which implied that investors could be periodically over-optimistic about the potential earnings of these new firms.

Farinós, García and Ibáñez (2002) also analyze the possible influence of investor behavior, which in their opinion could be the cause of the slow adjustment of prices of smaller companies that perform a secondary offering. Their study is based on the assumption that the quarterly earnings announcement provides valuable information that allows the market to update its future expectations for the performance of the company. Thus, it could be expected that small businesses performing a secondary offer had a positive reaction in the previous period to it, and got a negative reaction afterwards. However, the results of the study ruled out that investors are surprised by the operating performance of these firms when making this announcement, which could be interpreted as the quarterly earnings announcement does not convey incremental information to the market, or that the results are in line with the expectations they had. Since it seems that the hypothesis that investors are over-optimistic and slowly update their expectations is not conclusive, these authors studied the possible

influence of transaction costs, which could be related to an abnormal behavior of the stock, concluding that this is a more relevant factor than the one earlier mentioned when explaining the long-term abnormal behavior of the

public offer.

There are other works, like those made by Levis (1993), Aggarwal and Rivoli (1990) and Aggarwal et al. (1993), who also studied the variable of over-optimistic investors outside the United States, in countries such as Great Britain, Chile and Mexico. All of them have shown that the IPO performance adjusted by overall market or homogeneous companies portfolio performance is negative. Although IPOs represent profitable investment opportunities if the stocks are purchased at the price set in the initial offering, the empirical evidence seems to show that they should not be maintained in the long term. The only two countries which have positive abnormal returns are Sweden and Korea.

It is also necessary to address the research from a methodological point of view, like it has been done by Kothari and Warner (1997), Fama (1998), Lyon et al. (1999) and Loughran and Ritter (2000). All of them have argued that the method used in measuring the profitability has an impact both on the magnitude of abnormal returns and on the size and power of statistical tests.

Among the authors who disagree with the above, Brav et al. (2000) showed that there is no long term profitability of the IPOs lower than the benchmark, but very similar, provided that the comparison between companies is established on the basis of the size and book to market ratio of firms. A similar conclusion reached Álvarez and González (1999) in the study of the public offers between 1987 and 1997 in the Spanish market, stating the lack of long term underperformance. These authors also pointed out that the magnitude of abnormal returns depends on the methodology used, and to a lesser extent on the weighting scheme and the reference used for the adjustment of the returns of the IPO. Thus, if used BHRS (buy-and-hold returns, or the return an investor gets as a consequence of a strategy consisting in buying stocks at the end of the first trading day and holding them for a certain period of time), there will be low long term performances, while if other methods are used, such as estimating average or temporary returns, or the three-factor model of Fama and French, there will be positive long term returns. They also state that using a market index as a benchmark might bias significantly the statistical tests due to three reasons: new listing bias, rebalancing bias and skewness bias.

Choi, Lee and Megginson (2006), with a sample of 241 IPOs in 42 countries during the period 1981-2003, also address the methodological problem, indicating that previous work of Djankov and Murrell (2002) and Megginson and Netter (2001), among others, must be analyzed with caution, because of the existing problems regarding the selection of benchmarks and the method of calculating abnormal returns of the IPO. In addition, statistical tests

show a great complexity due to the high asymmetry of the distribution, as well as the whole cluster of observations. This study is a pioneer in using the three factors Fama-French model to examine the long term profitability,

using a calendar of regression by approach. It is also the first one using the method of "size and size-and BM matched firms" method to calculate abnormal returns, both for domestic and international markets. Its conclusion, like Álvarez and González (1999), is that the results of long term profitability are very sensitive to the reference markets, the methods of calculation and the weighting methods. They reaffirm that the previous studies defending the long term negative returns of the IPO in relation to the benchmarks are not reliable. They believe it is necessary to go a step further in subsequent studies and make an approach to the relationship between long term profitability of the IPO and the operating result.

Carter, Dark and Travis (2010) divide the IPOs analyzed in two different moments: from 1980 to 1998 and from 1998 to 2005. In the first segment focus IPOs with low performance, while in the latter this effect disappears. The explanation offered for this phenomenon is that in recent years, companies are trying to access capital markets at an earlier stage of their life cycle and, consequently, there has been a shift in the mechanisms offering new alternatives, such as mergers. In addition, the percentage of venture capital firms supporting IPOs has increased significantly.

Another factor cited as influential on IPO performance is the existence of asymmetric information between investors and issuers, which was extensively studied by Rao (1993) and Bhabra and Pettway (2000), who note that the information contained in the IPO prospectus that is available to the investor may not be enough, and can trigger a relative skepticism due to the limited operating history of the companies that carry out the IPO. However, in the Spanish capital market this should not be too relevant, as companies making an IPO tend to have greater operational history, 33 years on average, than Americans, with only 12.5 years on average according to the study of Ritter (1991).

It can not be forgotten the signaling hypothesis proposed by Allen and Faulhaber (1989), Welch (1989), Grinblatt and Hwang (1989) and Chemmanur (1993), among others, and confirmed by Alvarez and González (1999) in the Spanish capital market, Michaely and Shaw (1994) in the U.S., Levis (1993) in the UK, and Ljungqvist (1999) in Germany. This hypothesis considers that the issuers have better information than other investors about the current fair value of the stock and the risk of future cash flows. They signal positive information through the under pricing of the stock in the IPO. This is why the best companies offer undervalued IPOs to a greater extent in order to recover funds on former higher priced IPOs. The companies will place the shares at a price closer to its intrinsic value, which is incompatible

with low long term performances. In any case, signaling is costly as it results in a wealth transfer from initial owners to new investors.

Finally, other factors that have been cited as possible

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responsible for the IPOs performance are pricing (Carhart, 1997; Brav et al., 2000), the liquidity per share, defined as trading volume divided by the number shares outstanding (Eckbo and Norli, 2005); the asymmetry of market returns (Harvey and Siddique, 2000; Smith, 2007; Nguyen et al., 2007); and investment to explain the IPO price (Lyandres, Sun and Zhang, 2008).

This paper analyzes the profitability of Spanish IPOs in the period 2000-2010 both in absolute terms and relative to the IBEX (international business exchange (network) in two specific moments: one in the short term, but not on the first day of trading, but one month later, and another one that could be considered as medium term, one year after the company goes public. The novelty is precisely to choose two terms that have hardly been studied in the literature, and analyze profitability not only in absolute terms but also in relation to a benchmark which has not been taken into account in many studies earlier, either because they understood that what was important was the absolute performance, or because they thought the results could be biased when making this comparison.

MATERIALS AND METHODS

The sample for this work has been all IPOs in the Spanish market from 2000 until 2010, the first one being that of BBVA on May 24, 2000 and the last one Enel Green Power on November 4, 2010. The total number of IPOs in this sample was 45, whose distribution is given in Tables 1 and 2 along with the following information:

1. The retail price, meaning the price for individual investors who wanted to subscribe the IPO
2. The closing prices for the first day of trading after the IPO, one month and one year after the IPO
3. The closing prices for the IBEX index -official index of the Spanish stock market taken as a reference for being the most commonly used in this country- the day in which the IPO traded for its first time, one month and one year after that.

Since only 38 of the 45 companies have all the available data, the study focused on these companies and without the rest. Therefore, although the total number of observations is delayed until 2010, the study focuses on IPOs made in Spain by 38 companies in the period 2000-2009.

It should be noted that some of the companies analyzed, as Zeltia, Ence and Telecinco, made shortly after the IPO a split of its shares, an effect that has also been collected and considered in the study.

Since the purpose of the study was to determine whether the profitability of the IPO was better or worse than the IBEX index used as a benchmark, one of the key factors was to clarify the concept of return to take into account, as depending on that conclusions could vary. In this sense, it is understood by positive profitability a positive rate variation, either the next day or one year after the release of the company.

This decision has been taken considering that it is the best option when dealing with absolute values with very different scales, very hardly to be compared with another index.

For the study, a series of ratios have been calculated (Tables 1 and 2), whose results have been identified (-1.1) according to whether they obtained a positive event or negative event. There have been two types of ratios, the ratio that relates the profitability of the company one month after the IPO with the IBEX in the same period, and the

Table 1. Comparison between Spanish IPOs and IBEX performance in the first month of trading, period 2000 to 2010.

S/No.	Company	IPO date	Retail price	1	2	3	4	=((3/1)/(4/2))*100
				Closing price first trading day	IBEX closing price first trading day	Price one month later	IBEX price one month later	
1	BBVA	24/05/2000	13.61	14.16	10342.40	15.26	10533.30	105.82
2	D.TELEKOM II	19/06/2000	63.50	65.60	10595.60	60.45	10850.70	89.98
3	PRISA	27/06/2000	20.80	22.09	10528.20	24.01	10726.00	106.71
4	ZELTIA	04/07/2000	60.50	61.10	10848.90	60.80	10583.40	102.01
5	EADS	07/07/2000	18.00	15.24	10896.70	15.93	10707.70	106.42
6	SCH	11/07/2000	11.00	11.26	10874.80	11.83	11094.60	102.98
7	SOS CUÉTARA	26/09/2000	2.25	2.03	10956.00	1.87	10324.70	97.69
8	GAMESA	30/10/2000	4.20	5.60	10363.10	7.66	9214.50	153.84
9	KPN	17/11/2000	16.30	17.00	9845.90	13.82	9052.80	88.42
10	DEUTSCHE POST	19/11/2000	21.00	21.40	9548.60	22.78	9255.50	109.82
11	IBERIA	03/04/2001	1.19	0.86	9011.80	0.87	9497.20	95.77
12	INDITEX	23/05/2001	14.70	15.14	9632.60	15.75	8964.30	111.81
13	ENCE	10/07/2001	15.00	14.72	8465.10	15.31	8203.00	107.33
14	ENAGÁS	26/06/2002	6.50	4.72	6683.40	4.41	6303.40	99.06
15	BANESTO	27/11/2002	7.50	5.37	6700.10	5.18	6081.30	106.22
16	TELECINCO	24/06/2004	10.15	12.00	8162.60	12.43	7740.90	109.23
17	CORP.DERMOESTÉTICA	13/07/2005	9.10	10.82	9937.80	11.00	10184.90	99.20
18	RENTA CORPORACIÓN	05/04/2006	29.00	27.86	11916.40	26.04	12034.40	92.55
19	GLIFOLS	17/05/2006	4.40	4.80	11248.20	5.28	11056.80	111.90
20	GAM	13/06/2006	8.25	6.94	10797.50	8.46	11375.00	115.71
21	TÉCNICAS REUNIDAS	21/06/2006	17.00	15.23	11155.40	16.78	11333.90	108.44
22	BME	14/07/2006	31.00	21.78	11240.20	20.51	11903.30	88.92
23	VOCENTO	07/11/2006	15.00	12.23	14058.30	12.15	14062.80	99.31
24	VUELING	01/12/2006	30.00	32.99	13660.60	32.90	14364.40	94.84
25	CLÍNICA BAVIERA	03/04/2007	18.40	22.78	14953.20	23.37	14395.60	106.56
26	REALIA	06/06/2007	6.50	6.19	14928.80	6.37	15058.30	102.02
27	SOLARIA	19/06/2007	9.50	11.76	15000.20	12.64	15207.30	106.02
28	ALMIRALL	20/06/2007	14.00	13.47	15035.70	13.47	14930.10	100.71
29	CRITERIA	10/10/2007	5.25	4.44	14863.80	4.30	15774.70	91.25
30	CODERE	19/10/2007	21.00	22.00	15529.70	19.60	15539.30	89.04
31	FLUIDRA	31/10/2007	6.50	6.50	15890.50	5.69	15759.90	88.32
32	RENTA 4	14/11/2007	9.25	6.78	15808.90	6.43	15575.70	96.18
33	ROVI	05/12/2007	9.60	8.96	15802.20	9.94	14602.30	120.00

Table 1. Contd.

34	IBERDROLA RENOVABLES	13/12/2007	5.30	5.06	15499.20	5.39	14458.00	114.06
35	VERTICE 360 ⁹	19/12/2007	2.07	1.33	15177.10	0.87	13655.40	72.98
36	CAM	23/07/2008	5.84	5.61	11934.90	5.29	11497.30	97.94
37	ZINKIA	15/07/2009	1.92	2.45	9905.30	2.20	10901.90	81.59
38	SANJOSÉ	20/07/2009	12.86	13.52	10142.80	11.38	10892.50	78.38
	MEAN							101.29

Table 2. Comparison between Spanish IPOs and IBEX performance one year after the first day of trading, period 2000 to 2010.

S/No.	Company	1	2	3	4	=((3/1)/(4/2))*100
		Closing price first trading day	IBEX closing price first trading day	Price one year later	IBEX price one year later	
1	BBVA	14.16	10342.40	16.05	9616.20	121.91
2	D.TELEKOM II	65.60	10595.60	24.26	9047.90	43.31
3	PRISA	22.09	10528.20	11.83	8787.70	64.17
4	ZELTIA	61.10	10848.90	11.76	8885.00	23.50
5	EADS	15.24	10896.70	20.29	8501.90	170.68
6	SCH	11.26	10874.80	9.62	8266.10	112.40
7	SOS CUÉTARA	2.03	10956.00	1.74	7050.90	133.69
8	GAMESA	5.60	10363.10	4.27	7562.50	104.43
9	KPN	17.00	9845.90	6.90	8536.60	46.81
10	DEUTSCHE POST	21.40	9548.60	16.01	8691.10	82.19
11	IBERIA	0.86	9011.80	1.21	8236.10	153.59
12	INDITEX	15.14	9632.60	18.00	7902.10	144.96
13	ENCE	14.72	8465.10	16.10	6858.30	135.00
14	ENAGÁS	4.72	6683.40	5.66	6944.60	115.41
15	BANESTO	5.37	6700.10	6.48	7249.90	111.57
16	TELECINCO	12.00	8162.60	19.11	9677.40	134.32
17	CORP.DERMOESTÉTICA	10.82	9937.80	6.46	11375.00	52.16
18	RENTA CORPORACIÓN	27.86	11916.40	34.16	14974.90	97.57
19	GLIFOLS	4.80	11248.20	13.52	14968.20	211.66
20	GAM	6.94	10797.50	23.46	14829.80	246.13
21	TÉCNICAS REUNIDAS	15.23	11155.40	42.57	14882.40	209.52
22	BME	21.78	11240.20	33.30	15110.40	113.73

Table 2. Contd.

23	VOCENTO	12.23	14058.30	13.28	15841.90	96.36
24	VUELING	32.99	13660.60	12.85	15735.00	33.82
25	CLÍNICA BAVIERA	22.78	14953.20	15.39	13738.90	73.53
26	REALIA	6.19	14928.80	3.88	12909.80	72.48
27	SOLARIA	11.76	15000.20	9.87	12585.00	100.04
28	ALMIRALL	13.47	15035.70	12.66	12412.50	113.85
29	CRITERIA	4.44	14863.80	2.17	8997.70	80.74
30	CODERE	22.00	15529.70	10.49	9944.30	74.46
31	FLUIDRA	6.50	15890.50	3.31	9116.00	88.79
32	RENTA 4	6.78	15808.90	5.55	8832.20	146.44
33	ROVI	8.96	15802.20	6.08	8491.20	126.22
34	IBERDROLA RENOVABLES	5.06	15499.20	2.65	8975.50	90.21
35	VERTICE 360 ^o	1.33	15177.10	0.35	9268.40	42.64
36	CAM	5.61	11934.90	5.75	10369.80	117.96
37	ZINKIA	2.45	9905.30	1.29	10160.20	51.33
38	SANJOSÉ	13.52	10142.80	6.00	10061.30	44.74
	Mean					104.80

ratio that relates the profitability in the year following the IPO of the company analyzed with that of the IBEX. Both ratios have been multiplied by 100. Subsequently, the value 1 has been assigned when the profitability calculated as above was positive, this is when the calculated ratio was above 100. In Table 1 however, it does not appear for clarity of presentation of results.

On the contrary, the value -1 is assigned to negative events, those in which profitability declined in the period analyzed, obtaining a ratio below 100.

This decision is justified in order to eliminate possible bias if the majority of the shares had, for example, a very slightly inferior performance to the index, while a very small number of abnormally high returns absorbed the earlier giving a picture of overall good performance of IPOs which, in fact, would have been caused only by a series of exceptionally good individual cases.

In Table 3, another ratio has been calculated: the absolute performance, meaning this the performance of the company measured as its price one month or one year after the IPO

divided into the IPO price.

RESULTS

With the collection of adverse events, the results showed that 18 of the 38 companies surveyed (47.8%) obtained lower values than those of the IBEX one month after the IPO. The performance of the stock price independently of the IBEX was very similar (50% of negative events), as there was only one additional company to the previous with a negative return one month after the date of the IPO.

If instead of taking as reference the month period, the year after the date of the IPO was taken, the result obtained was slightly different. While the comparison ratio with the IBEX as a benchmark was maintained at the same level

(47.8%), the ratio of independent performance rose to the value of 60.5% of firms with negative returns. That is, the decline in profitability in the year following the IPO was greater in absolute terms than in relative terms taking the IBEX as a benchmark.

Finally, analysing the mean of all the companies in the sample independently of the IBEX, the result was very close to 100, with 100 being the market price of the company at the time of the IPO, 99.9 a month later, and 98.8 a year later. By contrast, an analysis comparing it with the IBEX, and taking the value of 100 as the reference on the date of the IPO, showed a rise to 101.3 a month later and to 104.8 a year later.

DISCUSSION

The conclusions of this work focus on the

Table 3. Spanish IPOs evolution one month and one year after the first trading day, period 2000-2010.

S/No.	Company	1	2	3	= $(2/1)*100$	= $(3/1)*100$
		Closing price first trading day	Price one month later	Price one year later		
1	BBVA	14.16	15.26	16.05	107.77	113.35
2	D.TELEKOM II	65.60	60.45	24.26	92.15	36.98
3	PRISA	22.09	24.01	11.83	108.71	53.56
4	ZELTIA	61.10	60.80	11.76	99.51	19.25
5	EADS	15.24	15.93	20.29	104.57	133.17
6	SCH	11.26	11.83	9.62	105.06	85.44
7	SOS CUÉTARA	2.03	1.87	1.74	92.06	86.04
8	GAMESA	5.60	7.66	4.27	136.79	76.20
9	KPN	17.00	13.82	6.90	81.29	40.59
10	DEUTSCHE POST	21.40	22.78	16.01	106.45	74.81
11	IBERIA	0.86	0.87	1.21	100.93	140.37
12	INDITEX	15.14	15.75	18.00	104.06	118.92
13	ENCE	14.72	15.31	16.10	104.01	109.38
14	ENAGÁS	4.72	4.41	5.66	93.43	119.92
15	BANESTO	5.37	5.18	6.48	96.41	120.73
16	TELECINCO	12.00	12.43	19.11	103.58	159.25
17	CORP.DERMOESTÉTICA	10.82	11.00	6.46	101.66	59.70
18	RENTA CORPORACIÓN	27.86	26.04	34.16	93.47	122.61
19	GLIFOLS	4.80	5.28	13.52	110.00	281.67
20	GAM	6.94	8.46	23.46	121.90	338.04
21	TÉCNICAS REUNIDAS	15.23	16.78	42.57	110.18	279.51
22	BME	21.78	20.51	33.30	94.17	152.89
23	VOCENTO	12.23	12.15	13.28	99.35	108.59
24	VUELING	32.99	32.90	12.85	99.73	38.95
25	CLÍNICA BAVIERA	22.78	23.37	15.39	102.59	67.56
26	REALIA	6.19	6.37	3.88	102.91	62.68
27	SOLARIA	11.76	12.64	9.87	107.48	83.93
28	ALMIRALL	13.47	13.47	12.66	100.00	93.99
29	CRITERIA	4.44	4.30	2.17	96.85	48.87
30	CODERE	22.00	19.60	10.49	89.09	47.68
31	FLUIDRA	6.50	5.69	3.31	87.59	50.94
32	RENTA 4	6.78	6.43	5.55	94.76	81.81
33	ROVI	8.96	9.94	6.08	110.89	67.82
34	IBERDROLA RENOVABLES	5.06	5.39	2.65	106.40	52.24
35	VERTICE 360 ^º	1.33	0.87	0.35	65.66	26.04
36	CAM	5.61	5.29	5.75	94.35	102.50
37	ZINKIA	2.45	2.20	1.29	89.80	52.65
38	SANJOSÉ	13.52	11.38	6.00	84.17	44.38
	Mean				99.99	98.76

evolution of listed securities to a maximum of one year after the IPO. Most of the works done to date have a longer time horizon, in some cases up to five years. Doukas and Gonenc (2003), the closest to the temporary extension of this work, studied the performance during the two years following the IPO, reaching the conclusion

that the profitabilities of these operations were slightly lower than those of the reference markets. Others like Ljungqvist (1997), Stehle et al. (2000), Levis (1993), Keasey (1992), Aggarwal et al. (1993), Keloharju (1993), Uhlir (1989), Ritter (1991), Loughran and Ritter (1995) and Brav and Gompers (1997) found clearly negative

returns from the third year of trading.

The fact that in the analyzed periods of one month and one year it appears that half of the cases underperform the index, while the other half outperforms it, together with existing research that indicate a clear immediate outperformance on the first day (Loughran et al., 1994; Ljungqvist, 1997; Kunz and Aggarwal, 1994; Keloharju, 1993; Jenkinson, 1990; Dawson, 1987; Aggarwal et al., 1993; Wethyavivorn and Koo-Smith, 1991), may indicate that the loss of profitability of the IPO is progressive as the underwriters stop to care for the stock with after market orders. Therefore, due to different periods analyzed, the conclusions drawn in this work can not be compared in an absolute manner with those of previous studies, and having as a reference only the first year of trading they can not be taken as definitive, needing to be contrasted with the study of returns over the next two years to at least have a period of three years in the studio and see if the trend of declining profitability is really progressive.

The results of this study show that nearly half of the companies that made an IPO obtained negative returns both in the first month and year of trading if compared to the IBEX.

Some previous studies claim that the poor performance of the IPOs could be due to the fact that many companies had gone public coinciding with the existence of a certain interest in some sectors which meant that investors could be periodically over optimistic about the potential gains from new businesses (Ritter, 1991; Aggarwal et al., 1993; Levis, 1993; Doukas and Gonenc, 2003).

In the cases analyzed in this study, that possibility is highly unlikely given the long period of time analyzed, including all kind of economic situations, and the existence of companies from diverse sectors.

As for the other half of the companies, which have some positive returns, it may be, as stated Brav et al. (1997) and Álvarez and González (1999), due to the fact that the issuer of the IPO in such cases has better information than other investors about the current fair value and future cash flows of the company, and therefore decides to underprice it in order to recover funds in former public offers with higher prices, which is incompatible with low long term performances. Should also be noted that, as stated by Lyon et al. (1999), Álvarez and Gonzalez (1999) and Loughran and Ritter (2000), diverse methodological factors, such as the chosen sample, the method used, the explanatory variables of behaviour, etc., can influence both the magnitude of profitability and the efficiency of statistical tests.

In this case, despite thinking that the best method is to compare the returns with the benchmark chosen, it must be admitted that these differences may arise with respect to previous studies.

Finally, the study was conducted only on the Spanish IPOs, which involves a significant territorial limitation, so the results should be treated with caution while not

confirmed with other countries in the same period.

Conclusion

After analyzing the results of this study, it can be said that the Spanish IPO outperform slightly the rest of the market in the short term, but this good performance is gradually diluted to the point that a year later more than half of the analyzed companies lose that outperformance, which becomes underperformance.

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Full Length Research Paper

Networking and women entrepreneurs: Beyond patriarchal traditions

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Entrepreneurs have changed the corridors of trade, commerce, and markets, through new goods, services and provide ways to modernization and creativeness. It is determined that forces of patriarchy, to a great extent manipulating their professional role and prohibit women to take part in economic activities independently. The study emphasized whether networking enable intended female entrepreneurs to overcome social, cultural, legal, and religious barriers faced by women entrepreneurs in Pakistan. The target population for this study was 950 women entrepreneurs (N = 950) and the sample size consisted of 428 women entrepreneurs engaged in SME all over Pakistan (n = 428). This study used non-probability snowball sampling technique. The study was carried out in two stages with independent sample. The present study proves that networking is supporting women entrepreneurship. The study shows that capability and opportunity recognition is higher among those women who are young, engaged in networking, and have business management background.

Key words: Networking, women entrepreneurship, women entrepreneurs, entrepreneurial capability, opportunity recognition, and patriarchal traditions.

INTRODUCTION

In this dynamic business environment the role of entrepreneurship in the economic turbulence has changed dramatically above the years presuming exceptional importance as a unique force to economic progress, business maturity, national augmentation, and employment creation relying on it. Consequently entrepreneurs are the seeds of industrial development and greater employment opportunities. Entrepreneurship leads to higher income, increases in per capita income, higher standards of living, individual savings, and revenue to the government. Entrepreneurs have changed the corridors of trade, commerce, and markets, through new goods, services and provide ways to modernization and creativeness.

It is believed that encouraging a dynamic pro-entrepreneurial background will capitalize on personal and communal economic and social achievement on a regional, national, and international scale. It is important

to understand that entrepreneurship on economic development diverges through improvement of a country, the part of economic action, and the amount and excellence of entrepreneurial provision. The intention of individuals to set up new businesses has proven to be a fundamental, enduring, frequently used, and continuing construct in entrepreneurship research (Thompson, 2009) and learning about their entrepreneurial talent only by starting a new firm (Stam, et al.,2008).

Women and Small Medium Enterprises (SMEs) play vital role in entrepreneurship development. A large number of women entrepreneurs are engaged in small size businesses and a small number busy running medium scale business. The overall distribution shows that 19% women entrepreneurs deal in retail, 27% in industrialized business, and 54% in services segment (Goheer, 2003). The service sector is most dominant among women entrepreneurs in Pakistan. In the given environment of social and cultural difficulties faced by female entrepreneurs in Pakistan, it may be noticed as a realistic entrepreneurial rejoinder to limited contribution towards economy. The sector wise engagement of women entrepreneurs is as: 47% women are engaging in textile/

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garment business, 34% are involved in education and health care, 33% in beauticians, 12% in manufacturing, 5% in food, and 12% in others (Goheer, 2002).

Pakistan needs entrepreneurship chiefly for two reasons: firstly to capitalize on new opportunities and secondly to generate new jobs. A large number of men and women are unemployed and this number is increasing day by day. Since the government may find it difficult to uphold the required level of employment, entrepreneurship is one of the resorts that can help to create new ventures and jobs also. Those who are familiar to entrepreneurship repeatedly communicate that they are having more openings to apply innovative choices, higher confidence, and on the whole superior intellect of command on their personal lives. The field of entrepreneurship should focus on recognition and utilization of future prospects, the individuals involved, and the modes of actions used to exploit the opportunities Bruyat, and Julien, 2000; Bygrave, 1994; Hitt et al., 2001; Zahra and Dess, 2001; Eckhardt and Shane, 2003; Davidsson and Honig, 2003). Wennekers and Thurik (1999) correctly noticed that 'SMEs are the medium in which entrepreneurship flourish.

The major reasons of the challenges faced by women entrepreneurs are two folds; one being the social and cultural norm of 'purdah' (veil) and 'Izzat', and the second being the concept of 'Chastity' (honor) which place severe restrictions on their mobility and they are not allowed to go out and work with men, and might cast doubts on their good reputation and reduce marriage chances. It is determined that forces of patriarchy, to a great extent manipulating their professional role and prohibit women to take part in economic activities independently (Shabbir, 1996; Shaheed, 1990; Shah, 1986; Roomi, 2003; Hibri, 1982). Keeping in view the mobility problem, they have to restrict their businesses to areas, such as education, health, beauty, etc where they have women employees to manufacture products for women customers (Roomi, 2003). Although, one can find a few women working in the non-traditional areas but they can be counted on fingers (Roomi, 2003). As their businesses grow, most of the women think that the hardest nut to crack is to deal with the labour force because most of the labour force is uneducated male, who are mostly rude and rough not ready to accept the authority of women.

The social and cultural portrait with minor differences enables a conventional patriarchal arrangement and roles based on sex. This is a critical omission from the understanding of women's entrepreneurship, because the social compositions, work, family, and planned social life differ broadly in rising economies (Allen and Truman, 1993; Aldrich et al., 1989). The labeled roles of imitation and manufacture allocated to male and female resolve on the whole atmosphere of Pakistani culture and institute the standing of man and women (Goheer, 2003; Roomi, 2003). The reproductive character bounds female to remain home, where they give birth to babies and increase the family. The convention of male respect linked with the

virginity of their female dealings curbs women's movements, bounds societal communication and compels a boundary on their economic engagement. The participation of women in economic activities is crucial not only from a human resource perspective but vital even for the objective of raising the status of women in society.

The present research is intending to study and explore how networking plays vital role to motivate and enhance women participation in entrepreneurship to make this large chunk of work force productive and useful. The present study is going to add Pakistani aroma to examine as to what kind of help Pakistani women entrepreneurs can get through networking. The women entrepreneurs in Pakistan are generally engaged in small medium enterprise, therefore, intends to examine how networking can help to motivate, encourage, and enhance women's participation in entrepreneurship. Another aspect of the research is to study how networking will enable intended female entrepreneurs to overcome social, cultural, legal, and religious barriers faced by women in Pakistan. The study examines the role of networking in creating conducive business environment to excel entrepreneurship generally and women entrepreneurship particularly in Pakistan.

LITERATURE REVIEW

Networking has captured the attention in the community of scientists and they are investigating the influence of networking on economics and entrepreneurship. Not only sociologists have a primary interest in networking, but economist, agriculturist, geologist, and management scientists also have analyzed social networking from different perspectives (Sanjeev and Van der Leij, 2006). To survive in this competitive world, it is imperative to develop a strong entrepreneurial and social network of information and referrals. Networking plays an essential part in binding and bringing firms together into a sound and innovative system of relational contracting, collaborative product development, and multiplex inter-organizational alliances (Staber, 2001). The networking is emerging as the signature of organization in this information age (Lipnack and Stamps, 1994). In this regard several related terms were used synonymously that include 'innovation system' (Braczyk et al., 1998), 'milieu' (Maillat, 1995) and 'cluster' (Porter, 1990). Information is a major resource for women entrepreneurs and can connect to marketplaces, suppliers; costs, technology, and networking have appeared as valuable policy for contributing assistance to female entrepreneurs (Frazier and Niehm, 2004). Networking provides entrepreneurs through a broad variety of priceless sources not previously in ownership and assist to accomplish their goals (Hansen, 1995; Jenssen, 2001; Ripolles and Blesa, 2005; Welter and Kautonen, 2005).

The negative aspect of networking is in their sterility, their failure to offer variety of thought, perspective and

opportunity (Dodd and Patra, 2002). It is suggested that evolution of relationally embedded networking ties may pre-sent several potential disadvantages (Coleman, 1988; Dubini and Aldrich, 1991; Granovetter, 1985; Hesterly et al., 1998; Portes and Sensenbrenner, 1993). The networking consisting of family and friends tend to move in the same circles as the entrepreneur, these resources may not offer much beyond the entrepreneur's own scope; they may not be adequately diverse in nature (Anderson et al., 2005).

Evidence suggests that there is also inertia in decision making (Capello, 1999). Networking actors may find it difficult to make effective use of knowledge because they face resistance from others to make changes in procedures in which knowledge is embedded (Lawson and Lorenz, 1999; Hoang and Antoncic, 2003). The networking can contribute in the form of over embeddedness, which occurs as the firm experiences an over abundance of embedded ties (Uzzi, 1997). It is observed that if the firm assumes all network ties need full relational embeddedness, it may allocate too many resources to tie development, experience excess constraints on actions, and be inhibited from successful early growth (Hite and Hesterly, 2001; Uzzi, 1996). Prior research has recognized that networking is a vital source of information for entrepreneurs and small enterprises (BarNir and Smith, 2002; Brush et al., 2001; Greve and Salaff, 2003). Based on the literature, the study asserts:

H₁: Entrepreneurial networking is positively associated with women entrepreneurs' participation in SMEs.

Capability is described as the personal's skill to make active individual sources, the surrounding's and enterprise's resources to deal with definite working conditions effectively like capabilities are firmly related to the way in which persons deduce and append significance to their occupation (Sandberg, 2000). It has been discussed widely that capability has an encouraging indication towards entrepreneurship (Bosma et al., 2002; Davidsson and Honig, 2003; Gimeno et al., 1997). The entrepreneurship research argues that capabilities and human capital have influence on entrepreneurship (Davidsson and Honig, 2003; Cuervo, 2005). The rationale of networking is to increase using sources previously not in custody of entrepreneurs. In this situation capability does not match with attained information, ability of resolving troubles, individual attributes simply; though it is relatively a compound notion together with several critical facets: actions, sources, and purposes, institutional corresponding persons, inside and outside enterprise consumers.

It is observed that individuals who are to start a new business have superior chances of involvement in entrepreneurship as against individuals who believe they lack this entrepreneurial capability simply because they do not have networking linkages. Prior research reveals that the entrepreneurship capability is important for becoming an

entrepreneur (Molinas, 1998; Man et al., 2002; Bosma et al., 2002; Davidsson and Honig, 2003). Entrepreneurs are defined as those individuals who exercise their ability and willingness to perceive new capabilities and to introduce specific ways of seizing opportunities into the market in the face of uncertainty (Wennekers and Thurik, 1999). Based on this literature, the study stressed:

H₂: Higher the entrepreneurial networking the greater will be the entrepreneurial capability among women entrepreneurs.

An entrepreneurial opportunity is defined as a composition of plans, convictions and deeds that make possible the formation of prospect products and services in the non-appearance of existing marketplaces for them (Venkataraman, 1997). According to Homans (1974) entrepreneurial opportunity is defined as an opportunity to engage in entrepreneurial action, in which entrepreneurial opportunity denotes a sub-class of some broader category of human action because all human action is arguably motivated by profit. Previous research described entrepreneurial openings are conditions in which novel goods, services, unprocessed objects, and managing processes can be initiated and sell at better price as compare to costs of manufacturing, (Casson, 1982; Shane and Venkataraman, 2000). A past study has revealed opportunity identification is higher among entrepreneurs who have family members in business or personally knowing somebody who has initiated a business (Matthews and Moser, 1995; Sanders and Nee, 1996; Davidsson and Honig, 2003; Morales-Gualdrón and Roig, 2005; Arenius and Kovalainen, 2006; De Clercq and Arenius, 2006; DeTienne and Chandler, 2007).

One of the central questions in the field of entrepreneurship has focused on the identification of opportunities. The identification of opportunities is important because it is always the first step in the entrepreneurial process (Baron and Shane, 2005). Traditionally, this line of inquiry has sought to understand why some people, and not others, identify entrepreneurial opportunities (Shane and Venkataraman, 2000). Recent research suggests opportunity insights are directly related to opportunity recognition experiences (Corbett, 2005) and the match of learning style demanded by a given situation (Dimov, 2007). Entrepreneurship research explained that networking (social networks) influence opportunity recognition, entrepreneurial direction, occupational judgment to turn into an entrepreneur, and grow as successful business (Singh, 2000; Hmieleski and Corbett, 2006; Ripolles and Blesa, 2005; Davidsson and Honig, 2003; Morales-Gualdrón and Roig, 2005; De Clercq and Arenius, 2006; Lee and Tsang, 2001; Ufuk, 2001). Based on this literature, the study emphasized:

H₃: Higher the entrepreneurial networking the greater will be the opportunity recognition among women

entrepreneurs.

METHODOLOGY

Sample

The target population for this study consisted of 950 women entrepreneurs (N = 950) and the sample size comprised of 428 women entrepreneurs engaged in SME all over Pakistan (n = 428). The study used non-probability snowball sampling technique also known as network, chain referral, or reputational sampling for identifying and sampling or selecting the respondents. The snowball sampling technique has been used by social researchers in interconnected network of people or organizations for primary data collection in the past (Babbie, 1995; Bailey, 1987; Kidder and Judd, 1986). The important feature of this sampling technique was that each respondent or subject was connected with another through a direct or indirect linkage.

Instrument

In this study both interviews and questionnaire based surveys were used for primary data collection. The interviews were conducted in the pilot study to find out the gaps. The main instrument for collecting primary data was questionnaire based survey. The data was collected from 428 women entrepreneurs in five major cities of Pakistan that is, Karachi Lahore, Islamabad/Rawalpindi, Peshawar, and Quetta. Data collection was difficult task in general and more troublesome when it comes to collect data from women respondents generally and in Pakistan particularly. Due to this issue in the present study respondents were personally persuaded to get filled in questionnaires and as a result out of the total 950 respondents, 428 responses were received, therefore, 43 % was the response rate.

Measurement

Entrepreneurial networking was measured by using three items from networking scale developed by Lee et al. (2001). The networking scale was further validated and used by (Taormina and Kin-Mei Lao, 2007).

In this study Likert scale was used rating options categorized as, 5= strongly agree, 4= agree, 3= neither agree nor disagree, 2= disagree, and 1= strongly disagree.

Entrepreneurial capability was measured by using six items from a scale of competence developed and used by a group of scholars (Hindle and Klyver, 2007).

The scale measured the level of entrepreneurial capability among entrepreneurs. In this study the same Likert scale categories were used.

Opportunity recognition was measured in different studies by using different scales. One of the scales used for measuring entrepreneurial opportunity was developed by (Crossan et al., 1999).

In this study entrepreneurial opportunity was measured by using six items from scale developed by Crossan et al. (1999). In this study the same Likert scale categories were used.

Procedure

This study was carried out in two stages with independent sample; Phase-1 was consisted of try-out or pilot study in which potential respondents were screened. Phase-2 constituted the main study

and consisted of hypotheses testing. The previous studies dealing with male entrepreneurs proved that networking has enormous influence on both entrepreneurs and entrepreneurship. The pilot study was conducted in the twin cities of Islamabad and Rawalpindi. As a whole thirty women entrepreneurs were selected for detailed interviews. Based on this pilot study it was examined that local business environment and culture is widely different from that of previous studies. As a result of this pilot study a comprehensive questionnaire was developed to gather data regarding networking and women participation in entrepreneurship.

The study combined the colours of exploration, description, empirical, and hypotheses testing couching the impact of networking on women entrepreneurs' participation in entrepreneurship through SMEs. The data was collected during face to face meeting with women respondents. The face to face meeting with women respondents was considered to be the most appropriate and effective method for a couple of reasons: Firstly, the researcher was able to understand as to how the respondents see and experience the world. Secondly, the face to face meetings enabled the researcher to capture the details needed for penetrating and gathering information without requiring contact over a prolonged period of time with the respondents. Thirdly, face to face meetings were helpful in explaining some of the questions.

The data gathering was started using the listings of various trade associations and agencies such as Chamber of commerce and Industry, Small and Medium Enterprise Development Authority (SMEDA), First Women's Bank, directories/yellow pages and other local directories etc. In this study snow balling technique was used to reach other women entrepreneurs so that data could be gathered from a representative sample and this technique worked well and slowly but steadily managed to have a comprehensive list of women respondents in five geographical locations that is, Karachi, Lahore, Islamabad/Rawalpindi, Peshawar, and Quetta. To ensure better representation, accuracy, and precision of the results only those female entrepreneurs included who were operating their businesses not from homes but at a proper site and were operative more than last 3 years were included.

RESULTS

The results of Table 1 reveal the mean, standard deviation, t-value, p-value and reliability of each variable of the questionnaire. The mean results of each variable show that almost respondents are agreed because the mean value is near to level of agreement (agreed=4) and most of the respondents are in favor of "networking and women participation" and have given their response about all variables positively. It is evident from Table 1 that the respondents have the highest level of agreement regarding the Networking. In the context of reliability of data, the networking section (3 items) with reliability of 79% and the Participation variable (4 items) has reliability of 80%, the Cronbach's Alpha of capability using (6 items) is 0.78 and the dimension of Opportunity recognition (6 items) has the maximum reliability that is 0.85. Table 1 further depicts the level significant of each variable, thus all variables are highly significant as shown p-value is less than 0.05.

The results of Table 2 demonstrate that there is significant correlation among all variables by summarizing the values of Pearson's correlation coefficient. It is clear from the result that at 5% level of significance networking is positively correlated with capability as the value of the

Table 1. Group statistics with respect to all variables, that is, networking, participation, competence, and opportunity.

Variable	Mean	Std. Dev.	t-value	Sig.2 tailed	Cronbach's alpha
Networking	4.0023	0.84515	97.972	0.000	0.79
Participation	3.9071	0.69877	115.676	0.000	0.80
Capability	3.9217	0.66219	122.522	0.000	0.78
Opportunity Recognition	3.9836	0.66373	124.169	0.000	0.85

Table 2. Correlation matrix of networking, competence, opportunity and participation correlations.

Variable		Networking	Capability	Opportunity recognition	Participation
Networking	Pearson correlation				
	Sig. (2-tailed)				
	N	428			
Capability	Pearson correlation	0.198 (**)			
	Sig. (2-tailed)	0.000			
	N	428	428		
Opportunity recognition	Pearson correlation	0.188 (**)	0.450 (**)		
	Sig.(2-tailed)	0.000	0.000		
	N	428	428	428	
Participation	Pearson correlation	0.091(**)	0.414 (**)	0.445 (**)	
	Sig. (2-tailed)	0.061	0.000	0.000	
	N	428	428	428	428

** Correlation is significant at the 0.01 level (2-tailed).

correlation coefficient 0.198. Opportunity recognition is also positively linked with networking and has statistically significant correlation coefficient 0.181 at 5% level of significance. The value of Pearson Correlation Coefficient is 0.09 which shows that participation and networking are positively correlated. Their relationship is significant at 5% level of significance. Finally, we can say that networking is positively and significantly correlated with all the variables. Networking is no more attached only to participation it is also accompanied by capability and opportunities recognition for encouraging women entrepreneurs.

DISCUSSION

This study reveals that women entrepreneurs'is greater among women who are connected through networking. The present study concludes that networking encourages women entrepreneurs to get access to resources and make easier to equip themselves for the forthcoming entrepreneurial responsibilities. The study shows that networking is helpful for transferring required knowledge and techniques to become entrepreneurs for women to

start new business and sustain the old ones better than competitors. This finding is in line with the framework and it is stated that networking plays a vital role to increase entrepreneurs' participation (Burt, 1992; Fong and Ooka, 2002; Portes and Sensenbrenner, 1993).

The study confirms that capability is greater among those women who are linked to each other through networking. The study further confirms that higher the capability the greater the women participation in entrepreneurship. The present finding states that networking plays vital role to enhance entrepreneurial capability among women entrepreneurs and ultimately it leads to increase participation among women entrepreneurs in Pakistan. The present study finding is in harmony with the previous research findings (Hunt, 2000; Lambe et al., 2000; Simonin, 1997; Sivasdas and Dwyer, 2000; Hunt and Morgan, 1995, 1996, 1997; Spekman et al., 1999; Dyer and Singh, 1998; Jap, 1999).

Opportunity recognition motive has been established as a distinguishing factor among women entrepreneurs in Pakistan. It is concluded that there is a positive and significant relationship between opportunity recognition, networking and participation among women entrepreneurs. The study further confirms that opportunity

recognition varies among women entrepreneurs and helps women entrepreneurs to increase participation in entrepreneurship (Buchanan and Vanberg, 1991; Baron and Shane, 2005; Corbett, 2005; Mises, 1949; Casson, 1997; Mitchell et al., 2000; Simon et al., 2000; Alvarez and Busenitz, 2001). This study concludes that entrepreneurial participation is greater among those women who are member of a networking group. This finding is in line with the framework and theory in which it is stated that opportunity recognition plays central role to enhance women participation in entrepreneurship (Gaglio and Katz, 2001; Venkataraman, 1997; Singh et al., 2000; Sarasvathy, Simon and Lave, 1998).

Conclusions

The primary intention in this study is to investigate that networking enable women entrepreneurs to access key resources from its environment, such as information, access, capital, goods, services and so on that have the potential to maintain or enhance individuals or firm's competitive advantage. It is agreed that successful entrepreneurs shape a considerable section of those selecting to be entrepreneurs all over the world are connected through networking (Minniti, Arenius and Langowitz, 2005; Mitra, 2002; Snyder, 2003).

In this study the first hypothesis that entrepreneurial networking is positively associated with entrepreneurial participation among women entrepreneurs has been accepted. It is further elaborated that entrepreneurial networking is accepted as a distinguishing factor among women entrepreneurs. The mean values are almost close to 4 which means (agreed=4) all respondents agree that networking plays vital role to promote entrepreneurship. In present study the second hypothesis that the relationship between entrepreneurial networking and entrepreneurial capability among women entrepreneurs has been accepted.

The present study reveals that entrepreneurial capability has been accepted as a distinguishing factor among women entrepreneurs. Table 2 indicates that networking and capability are positively correlated which means higher the networking the greater will be the capability and thus encouraging women to become entrepreneurs. This finding is line with the previous studies all over the world (Bosma et al., 2002; Davidsson and Honig, 2003; Foss, 1994; Gimeno et al., 1997; Hunt, 2000; Lowendahl and Haanes, 1997).

The study proved the third hypothesis that relationship between entrepreneurial networking and opportunity recognition among women entrepreneurs has been accepted. Table 2 discloses that networking and opportunity recognition are positively correlated which denotes that higher the networking the greater will be the opportunity recognition and this will lead to increase participation among women entrepreneurs. The study confirms that by forming or joining networks, startups

entrepreneurs and firms consequently use societal, technological, and profit-making aggressive sources that usually need years of working knowledge to gain success (Ahuja, 2000; Nohria and Garcia-Pont, 1991).

IMPLICATIONS AND FUTURE RESEARCH

There is an impending requirement to stimulate other women to start entrepreneurial action and recognize their prospective by using existing opportunities whilst at the same time sensitizing executing institutions according to the needs of women entrepreneurs. The present study will help women to think raising their issues and challenges with top policy making people and institutions perhaps leading to establish a forum for women entrepreneurs, women associations and bodies to discuss with government officials to address these issues.

The study will encourage women to mobilize in groupings to shape networking to assist and get contact to finance, markets, training, information, and bargain superior terms of reference. This study is expected to provide guide lines to policymaking bodies and other trade related bodies. This study will contribute to create awareness regarding the importance of women entrepreneurship and support to create a conducive environment to train women entrepreneurs. The study will further contribute towards individual entrepreneurs generally and women entrepreneurs specially, to acquire and develop and information technology skills (information collection).

The networking is an important source that women can tap to increase their motivation and participation in entrepreneurship.

It is found that Pakistani women tended to have homogeneous networking at a limited scale, whereas, heterogeneous networking was found to have greater effect to access information and resources. The study analysis confirms that women connected through networking and information from multiple sources is much likely to participate in entrepreneurship. The study predicts that women entrepreneurs may possibly augment their primary performance by establishing and configuring networking due to lower expenditures of approaching information and techniques for increasing their presence in entrepreneurship.

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Full Length Research Paper

Determinants of corporate hedging policies: A case of foreign exchange and interest rate derivative usage

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Derivatives are mostly used by corporations to hedge their foreign exchange or interest rate risk, especially in Asian countries due to their highly volatile political and economic situation. Current study aimed to determine the factors affecting firms hedging policies of both foreign currency and interest rate derivative instruments of 105 non-financial firms listed on Karachi Stock Exchange for the period of 2004-2008. Logit model was used to test whether the firm's decision to use hedging instruments can increase firm value? For a detailed analysis, firm's endogenous policies were regressed separately to identify the effect of firm's investment and financing policies on firm's hedging policies. The estimated results supported the financial distress hypothesis, tax convexity, underinvestment hypothesis and managerial risk aversion hypothesis. Though, inconsistent with the theory, interest coverage ratio demonstrated positive effect on firms hedging policies that may be attributed to the lag period effect.

Key words: Derivatives, hedging, foreign exchange derivatives, interest rate derivatives, Pakistan.

INTRODUCTION

Economic liberalization, proliferation of information technology, removal of free trade barriers, loosening of restrictions on capital flows and economic activity have contributed towards the growth in international trade from the last two decades. The growing international trade and capital flows not only enable firms to increase their profits by capitalizing on unexplored market opportunities but also increase firm's risk exposure as well. Corporations therefore, are also focusing on risk management policies along with other financing and investment policies in order to minimize unpredictability of firms projected earnings due to the variations in interest rates and foreign exchange exposures.

Growing globalization trend has encouraged many investors to extend their businesses across geographical boundaries in order to exploit un-tapped market. Whereas, situations like Asian crises of 1998 and U.S financial crises of 2007 had increased exchange rate and interest rate exposure for corporations in general, and firms

engaged in international trade activities in particular. Unstable political and economic situation had made net cash flows more sensitive to interest rate and exchange rate volatility and therefore, increased the trading of derivative instruments in Asian countries. To deal with such a volatile financial environment, financial professionals have developed both off-balance sheet and on-balance sheet financial instruments in order to manage risk arising from various sources. Survey report of International Swaps and Derivative Associations reported that the usage of interest rate derivatives increased from USD 69.2 Trillion in 2001 to USD 464.7 Trillion in 2007, while, credit derivatives and equity derivatives showed an increase of approximately 69.33 and 11.9% respectively from 2001 to June 2008.

This increase usage of derivative instruments has motivated many researchers to explore the reason behind firm's decision to use derivative techniques for hedging risk exposure. Traditional paradigm by Modigliani and Miller (1958) asserted that firm's decision to hedge its risk exposure has no effect on firms' value. While, hedging theorists identified financial distress costs, agency costs of debt, underinvestment hypothesis, tax convexity,

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agency costs of equity and hedging substitutes as the main determinants of firms hedging policies for both foreign currency and interest rate derivative instruments. Researchers have tried to empirically examine the impact of above factors on firms hedging policies mostly in developed countries, whereas, very few studies have focused on developing and emerging economics. Despite of a volatile political and economic situation of Pakistan from the last five years no study has explored the determinants of firm's hedging policies of non-financial firms of Pakistan. Current study attempts to fill this gap by identifying the factors affecting the firm's hedging policies of using interest rate and foreign currency derivative instruments of 105 non-financial firms listed on Karachi stock Exchange for the period of 2004 to 2008.

LITERATURE REVIEW

Formerly, corporations are employing diversification strategy of Markowitz (1952) in order to reduce firms' systematic risk (Sprcic, 2008). Financial managers characterize diversification approach as an operational hedging technique as firm invests in any unrelated or outside the geographical boundaries projects. This strategy though provides synergy to firm, but adoption of mixed floating exchange rate regime by mostly countries has made expected cash flows more exposed to exchange rates and interest rates volatility. Corporations are, therefore, engaging in aggressive financing policies, such as higher liquidity, lower leverage and investment expenditures in order to ensure investors that sufficient funds are available in hand for precautionary motives, yet on the other hand aggressive financing policies increase opportunity cost for firms. Therefore, as an alternative, financial professionals have developed derivative instruments in 1970s as a hedging instrument to hedge corporation's risk exposure.

Researchers have tried to determine that under frictional world, usage of hedging instruments can enhance firm value.

Smith and Stulz (1985) states that firms having higher financial distress costs, leverage, growth opportunities and tax convexity are exposed to higher foreign exchange and interest rate exposure and thus, are more probable to use hedging instruments. Bessembinder (1991) stated that hedging provides an incentive for a firm to reduce opportunistic behavior of bond holders and therefore, enhances firm's value. Froot et al. (1983) empirically find that firms with higher growth opportunities and financial constraints are more likely to hedge corporation's risk exposure, which is later on empirically supported by the Gay and Nam (2002) by using the data of 486 U.S non-financial firms for the period of 1993 to 1995.

Obtaining a sample data of 711 U.S firms for year 1992, which discloses their usage of derivative

instruments, Mian (1996) reports mixed evidence regarding tax convexity and growth opportunities whereas growth options show significant negative effect on corporation's decision to use hedging instruments and this might be due to the high financial reporting cost in time of growth whereas size supports economies of scale hypothesis. By using 100 U.S oil and gas producer companies, Haushalter (2000) identifies the determinants of decision to use derivatives and the extent of such decision. By taking fraction of oil and gas revenue being hedged as dependent variable, independent variables are regressed via Tobit model. Study estimates a positive relation between decision to use derivative and leverage, debt constraint, investment expenditures and tax convexity. While dividend payout, managerial ownership and basis risk have demonstrated negative effect on firm's decision to hedge risk exposure.

Another study by Foo and Yu (2005) has explored the determinants of firms' hedging policies by using a sample data of 297 firms of fortune 500 for the period of 1997. Empirical results support underinvestment hypothesis and economies of scale. Leverage though positive but not consider as an important factor in driving firms hedging policies, whereas mixed findings are documented by tax convexity and managerial ownership. Via survey data, Kapitsinas (2008) studies the usage and practice of derivative instruments of 62 Greece non-financial firms for the year of 2005. Survey findings for motives behind firm's decision to use derivative instruments report that 61.9% corporations are using derivative instruments for reducing cash flow variability and 47.62% corporations employ derivative instruments to minimize variation in accounting earnings. Hedging the balance sheet account and firm value are the objective of only 9.52 and 4.76% derivative usage, respectively.

In order to examine the relationship between firms' riskier policy choices and compensation plan, Coles et al. (2006) test sample data of fortune 500 firms for the period of 1992 - 2002. Results support a positive relationship between Vega and riskier policy choices whereas delta depicts negative effect on firm's riskier policies. According to Fok et al. (1997), instead of using off-balance sheet hedging instruments corporations can reduce their risk exposure by altering on-balance sheet items or financing policies, therefore, researchers have used liquidity, dividend payout and hybrid securities as substitutes of hedging (Nance et al., 1993).

Considering different sample data set, researchers have explored determinants of firms hedging policies via Logit and Tobit model. Abolhassan Jalivand (1999), Berkman and Bradbury (1996), Singh and Upneja (2009) and Heaney and Winata (2005) finds a significantly positive relationship between leverage and firms decision to hedge risk exposure via derivative instruments. In addition to them Schiozer and Saito (2009) and Allayannis and Ofex (2001) observe that larger firms are more tend towards using derivative instruments. Positive influence

of hedging substitutes and tax convexity on firms decision to use derivative instruments have been observed by Abolhassan Jalivand (1999), Berkman and Bradbury (1996), Geczy et al. (1997), Schiozer and Saito (2009), and Heaney and Winata (2005). While Singh and Opneja (2009), Schiozer and Saito (2009), Geczy et al. (1997) demonstrate positive effect of growth options on firms derivative usage whereas mixed findings are estimated by researchers for managerial ownership.

Existing literature depicts that major part of empirical studies explore hedging patterns of U.S non-financial firms though only few have explored Asian non-financial firms like Faizullah et al. (2008) and Ameer (2009). Despite of highly volatile political and economic situation of Pakistan, the empirical investigations on the determinants of firm's hedging policies of Pakistani non-financial firms is yet to be undertaken. Therefore, to fill this gap, current study intends to examine the determinants of hedging policies by using the data of 105 listed non-financial firms of Pakistan for the period of 2004 - 2008. Moreover, present study also intends to facilitate decision makers in identifying hedging policies while considering the agency cost of debt and equity.

METHODOLOGY

Following Berkman and Bradbury (1996), the study intends to identify the impact on firms hedging policies of financial distress costs, underinvestment costs, tax convexity, managerial incentives and other control variables on firms hedging policies for both interest rate and foreign exchange derivative instruments. Sample data is classified into two groups, users of derivative instruments and non-users, in order to test whether users are significantly different from non-users in their operating characteristics; non-parametric Mann-Whitney U test is used. Furthermore, it is assumed that firms use derivatives to hedge foreign exchange risk and interest rate risk, hence, in order to test whether firms use derivatives to hedge risk exposure or not, Logit model is used with binary value 'one' for derivative users and 'zero' for non-users.

In order to test empirically the factors affecting the firm's decision to use various hedging techniques, a sample data of 105 non-financial firms are taken for the period of 2004-2008. According to International Accounting Standards (IAS) 32 and 39, it is mandatory for firm's to disclose their usage of hedging instruments and their respective fair value in the notes of annual reports in a uniform manner.

Almost 60% of total sample data firms declared their usage of foreign currency derivatives and 70% firms of total sample data are identified as interest rate derivative users.

Financial sector has been excluded from the sample data since their business activities required derivatives to be used in trading or speculative motive.

Model 1 depicted that derivative usage is a function of size, financial distress costs, tax convexity, asset growth cash flow, profitability, managerial ownership and foreign sales.

$$DERIV_{it} = a + b_1a + b_1INCOV_{it} + b_2b_2SIZE_{it} + b_3b_3AGCF_{it} + b_4b_4MO_{it} + b_5b_5TAX_{it} + b_6b_6FS_{it} + ee_{it} \dots\dots\dots (1)$$

Where, SIZE = log of total assets; INCOV = ratio of earning before interest and taxes by interest expense; TAX = binary value 1 for unused tax losses and 0 otherwise; AGCF = ratio of change in

tangible assets plus depreciation by addition of net income and depreciation; MO = log of managerial holdings; FS= log of foreign sales and DERIV = dummy one if firm use foreign currency or interest rate risk derivative instruments and zero otherwise.

In order to identify the endogeneity effect, Mian (1996) studied the impact of leverage, dividend payout and liquidity on derivative usage. Firm's investment and financing policies can be effected from firm value; therefore model 2 is regressed by using Logit model to determine endogeneity effect of leverage, growth options, dividend payout and liquidity on firm's decision to use derivative instruments to hedge their foreign currency and interest rate risk exposure.

$$DERIV_{it} = a + b_1a + b_1LEV_{it} + b_2b_2MTB_{it} + b_3b_3LIQ_{it} + b_4b_4DP_{it} + ee_{it} \dots\dots\dots (2)$$

Where, LEV = ratio of total debt to total assets; MTB = ratio of market value of firm to book value of firm; LIQ = ratio of subtraction of current assets minus inventory to current liabilities and DP = ratio of dividend payout per share to earning per share.

RESULTS

Univariate analysis

For in-depth analysis, variations in firm's specific operating characteristics for both users and non-users were examined through Mann-Whitney U test.

Column 1 of Table 1 consists of the list of independent variables. Column 2 and 3 reported descriptive statistics of users and non-users, while last column demonstrated mean difference values for both the users and non-users. Findings characterized users as large size financial distressed leveraged firms having higher growth opportunities, tax convexity and foreign exchange exposure.

Though, users were identified as profitable firms with more ability to pay finance costs but still they were unable to finance their growth opportunities as they were depicted as financially constrained firms with lower liquidity level and higher dividend payout ratio. Furthermore, consistent with the agency costs of equity, firms with high managerial ownership had higher derivative usage.

In comparison, non-users were small size less financial distressed firms. Corporation's inability to pay their finance costs decreased their ability to take more debt. In addition, non-users faced lower growth opportunities and therefore, despite of lower profitability level they were in a position to finance their growth opportunities. Users were observed as statistically significant from non-users in terms of financial distress costs, size, growth opportunities, managerial ownership and foreign exchange exposure.

Table 2 described correlation matrix of independent variables. Excluding factors defining firm's endogenous policies, Model 1 illustrated that firms with higher ability to pay finance costs have lower capability to convert its growth options into assets in place, tax losses, managerial ownership and foreign exposure. Whereas, positive correlation between firm's ability to pay its finance costs and size explained that larger size firms have enough

Table 1. Univariate analysis for all derivatives.

Variable	Mean non-user (96)	Mean user (248)	Mann-Whitney U test
LEV	0.5654 (0.2002)	0.5849 (0.2071)	-0.701 (0.484)
INC	4.7889 (3.5865)	4.9298 (3.2522)	-0.721 (0.471)
SIZE	6.2406 (0.6067)	6.4315 (0.5786)	-2.349 (0.019)**
MKBK	1.1556 (0.6790)	1.2484 (0.5978)	-2.323 (0.020)**
AGCF	2.1383 (2.3859)	2.4866 (2.4226)	-1.512 (0.131)
DP	0.1899 (0.3879)	0.2029 (0.3416)	-1.390 (0.165)
QR	3.0264 (1.5272)	2.8254 (1.6601)	-1.617 (0.106)
MNGRL	3.4457 (1.5224)	3.8594 (1.3306)	-1.886 (0.059)*
TAX	0.3958 (0.4916)	0.4274 (0.4957)	-0.532 0.595
LFS	1.8286 (2.5762)	3.0491 (2.7879)	-0.6727 (0.000)***

***, **, * are 1, 5 and 10% respectively

Table 2. Correlation matrix.

Model 1	INC	SIZE	AGCF	TAX	ILMNGRL	LFS
INC	1					
SIZE	0.18	1				
AGCF	-0.182	-0.026	1			
TAX	-0.291	0.0562	0.0273	1		
LMNGRL	-0.0886	0.2868	0.0755	0.1986	1	
LFS	-0.1367	0.0583	0.1428	0.1353	0.1017	1

Model 2	LEV	MKBK	DP	QR
LEV	1			
MKBK	-0.073	1		
DP	-0.0086	0.0365	1	
QR	-0.3852	0.0878	-0.0005	1

cash in hand or having access to cash because of institutional stake, hence can easily pay their interest payments.

Moreover, financially distressed firms had higher unused tax losses and foreign exchange exposure. Model 2,

Table 3. Logit regression for all derivatives by using panel data analysis.

Binary	Model 1			Model 2		
	Coefficient	Z	P>z	Coefficient	Z	P>z
LEV				0.4484	0.1	0.424
INC	0.0467	1.75	0.032**			
SIZE	0.4620	1.84	0.065*			
MKBK				0.2856	1.47	0.14
AGCF	0.0036	0.1	0.921			
DP				0.0203	0.29	0.769
QR				-0.0395	-0.88	0.378
TAX	0.2603	0.9	0.368			
LMNGRL	0.2311	2.39	0.017**			
LFS	0.2202	4.09	0.000***			
_cons	-3.0722	-1.98	0.048***			
Logit regression	Number of observation=340 LR Chi square (9) =44.55 Prob > Chi square=0 Pseudo R ² =0.1101			Number of observation =323 LR c chi square (4)=3.47 Prob > chi square=0.4832 Pseudo R ² =0.009		

***, ** and * are significant at 1, 5 and 10% respectively

documented correlation coefficients of firms' endogenous policies, supported pecking order theory that firms possessing growth opportunities were more likely to finance these opportunities through internally generated funds. Moreover, negative relationship between leverage and quick ratio demonstrated that they both work as a substitute of each other.

Empirical findings regarding firms' decision to use derivatives to hedge foreign exchange risk and interest rate risk were reported in Table 3. Model 1 showed that, supporting economies of scale, large size firms were more likely to use derivative instruments to hedge risk exposure. Aligned with underinvestment hypothesis, corporations with higher market to book ratio and inability to convert these growth options into assets in place were observed as larger interest rate and foreign exchange derivative user. Significant positive relationship between managerial ownership and usage of derivative instruments proved existence of agency of cost of equity in Pakistan.

Corporations with higher foreign exchange exposure were found to be the significant user of foreign exchange derivative instruments. Tax convexity showed insignificant positive impact on corporation's usage of derivative instruments, depicted that marginal gain obtained from hedging unused tax losses was approximately equal to the cost of the employing interest rate and foreign exchange derivative instruments. Except for interest coverage ratio, all other variables depicted signs consistent with the hedging theory. It was expected that corporations having less ability to pay their finance costs were more likely to use foreign currency or interest rate

hedging instruments. But positive relationship between firms' ability to pay its finance costs and usage of hedging instruments explained that in order to avoid any adverse circumstances firms that were still in a position to pay their finance costs were using interest rate and foreign currency derivative instruments.

Model 2 exhibited effect of firm's endogenous policies on its decision to use interest rate and foreign exchange derivative instruments. Consistent with financial distress hypothesis, financially leveraged firms were assumed to be the derivative user in order to reduce variability in net income. Highly growth oriented firms demonstrated positive relationship with derivative usage, coherent with underinvestment hypothesis. Corporations having higher dividend payout ratio and liquidity constraints were more probable to use interest rate and foreign exchange derivative instruments in order to hedge variability in net income. All the coefficients of Model 2, that were leverage, growth options, dividend payout and liquidity, support hedging theory, though results were insignificant.

Conclusion

It is generally argued that the overall change of a country's economic and political situation expose firms to changes in interest rates and foreign exchange rate risk, thus increasing firm risk level. Derivatives are therefore, widely used by many firms to hedge firms' interest rate risk and foreign exchange rate risk. Current study attempts to identify the factors influencing the firms' decision to hedge their risk by using the data of 105 listed

non-financial Pakistani firms for the period of 2004 - 2008. Overall, findings support Smith and Stulz (1985) that firm can achieve its primary goal of shareholders' wealth maximization through optimal utilization of the hedging technique.

Empirical estimation supports financial distress hypothesis that corporations having lower tangible assets and higher leverage ratio are more likely to use hedging instruments in order to reduce the variability in net income.

Confirming existence of agency cost of debt and equity in non-financial firms of Pakistan, findings describe that corporations having higher growth opportunities and managerial ownership can enhance firm's value by optimally employing hedging instruments. Moreover, corporations with higher foreign exchange exposure are more likely to employ hedging instruments, while contradictory with the financial distress theory, positive relationship between firms' interest coverage ratio and hedging usage might be due to the lag period effect of firm's derivative usage in previous year.

The interest rate hedging instruments facilitate corporations to take debt at a lower interest rate, which enables firms to pay their finance costs in upcoming years.

Current Study attempts to identify the determinants of firms hedging policies for both interest rate and exchange rate exposure and helps academics in identifying the factors affecting the firm's decision to hedge its risk exposure in emerging countries like Pakistan.

However, the results of this study may be biased since a large number of sample firms are using interest rate derivative instrument as compared to foreign exchange derivative instruments, so future research could be focused on determining the factors affecting interest rate and foreign currency derivative instruments independently.

For practitioners, study facilitates in understanding how corporations can enhance firm's value by reducing financial distress costs, underinvestment costs and agency cost and foreign exchange by defining firm's hedging policies along with other corporate financial decision. For policy makers, this study explains that despite of illiquid and amateur Pakistani derivative market;

Pakistani non-financial firms decide to use hedging techniques in order to minimize financial distress costs, financial constraints and foreign exchange exposure. Therefore, policy makers should develop a well-organized exchange traded derivative market so that large sized financially constrained firms with highly variable cash flows, leverage, growth options and foreign sales can get benefit by optimally utilizing hedging techniques. As a result, it will not only facilitate the firms to achieve their primary goal of shareholders' wealth maximization – but may also enhances economic growth.

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Full Length Research Paper

A research agenda on the leaders' political intelligence for effective change management

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This paper presents a construct and model of the organizational leader's political intelligence to conceptualize the role of political intelligence in effectively managing organizational change. Pertinent approaches to political intelligence that scholars have taken were reviewed with the aim to build a theory. Basing our model on the dimensionality of political intelligence identified in light of literature, the chief proposition is that political intelligence can help facilitate organizational change effectively. The politically intelligent leader is capable of steering the stormy waters of organizational change using his political intelligence. Based on this theoretical model, a case is made for an empirical investigation. This paper sheds light on the implications of this theory for change leaders.

Key words: Political intelligence, change management, leadership, change leader.

INTRODUCTION

What makes a leader has always been a subject of relevance; hence, leadership has always been an area of interest for researchers. Initial studies attempted to grasp the behavioral or personality aspect of leaders, while recently scholars have focused on leadership styles (Nawaz and Bodla, 2010). Despite the abundant literature devoted to understanding leadership (Pienaar, 2009), successful leaders are deficient in organizations and hence more research needs to address the issue of leadership and leaders (Schafer, 2010). In recent literature, the so-called 'new-paradigm' leadership models are based on a leader's capacity to deal with the realism of persistent change (Alimo-Metcalfe and Alban-Metcalfe, 2005). The leader's role throughout the entire change process is crucial and a challenging responsibility (Yukl, 2007). In fact, it is leadership that initiates change (Owen and Demb, 2004), and plays a central role in its success (Gill, 2001; Miller, 2002; Oakland and Tanner, 2007). Hence, organizational change is a leadership goal, that may be pursued via the use of political intelligence (PI) of the leader. Yet, how change leaders may use their PI to

affect organizational change is not well comprehended today. Specifically, leadership theories today have recognized the significance of politics for leaders and organizations, yet they have failed to examine how a leader may employ PI to affect change. Leader PI has been studied in relation to employee trust, organizational cynicism, job satisfaction (Treadway et al., 2004), yet, no study so far has explicitly addressed effective change management as an outcome of the leader PI. Additionally, several studies have highlighted the significance of emotional intelligence for leadership (Radhakrishnan and Udayasuriyan, 2010; Groves et al., 2006; Palmer et al., 2001), as well as for change management (Vakola et al., 2004; Chrusciel, 2006; Groves, 2006). Yet, PI is a leadership intelligence that holds implications for change management but is largely overlooked in the conceptual as well as in empirical sense. This paper aims to bridge these gaps in the existing literature by offering a model that proposes how leaders may employ PI to bring change in organizations.

The purpose of this paper is to conceptualize PI and to develop a research model that proposes relationships between dimensions of PI and effective change management. The study builds on the existing literature on PI and change management and sets a research agenda for

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empirical evidence. The purpose behind a construct and theoretical model in the area of political intelligence and change management is three-fold. Firstly, the focus is on enhancing awareness of how PI can be used to facilitate change in organizations. Organizational leaders can use this awareness to bring change. Secondly, this study will highlight the positive side of politics. Thirdly, this theoretical model is aimed to recommend empirical research into this area. Scholars and practitioners have realized the existence and significance of organizational politics. At the same time, the inevitability of organizational change is also realized. The need of the hour is to investigate how organizational change may be affected using PI. This study takes a leadership perspective on this issue, since change is primarily top-driven.

LEADERSHIP, CHANGE MANAGEMENT, AND PI: THEORETICAL REFLECTIONS

Scholars have highlighted the need to re-assess our understanding of leadership in context of the technological, economic, social, and political changes of the 21st century. It is leadership that endorses organizational change and so researchers have attempted to assimilate leadership theories and organizational change (Eisenbach et al., 1999; Yu et al., 2002). At the same time, researchers have examined leader behaviors in the context of change (Herold et al., 2008). Researchers have also turned to emotional intelligence with the pursuit of enhancing understanding of organizational change (Huy, 1999). Since leadership is complex, it has been studied in several ways (Lussier and Achua, 2010). The question that still remains today is: what makes change management leadership successful? We believe that it is the leader's PI that helps steer the squally waters of organizational change.

Leadership entails essence successfully influencing followers so as to achieve goals (Bass and Bass, 2008). Our main argument is that it is the political successful leader, who organizes resources to achieve goals via the use of power and influence (Lussier and Achua, 2010). Conversely, the ability to successfully manage change is a most sought-after managerial skill (Anderson and Anderson, 2001). Simply put, it is a practicing leader who facilitates an organization in adjusting to change (Mostovicz, 2009), thereby giving life to organizational change. Contemporary leaders have to be more capable on the political, amongst other, fronts (Peled, 2000). The implication for change leaders is plain - they need to be politically intelligent to be effective at bringing change (Perrewe et al., 2000). Moreover, regardless of their role and title, effective leaders need certain qualities that Cook and Macaulay (2004) term as the 'four intelligences' essential for effectively managing change. While not denying the importance of other intelligences for organizational change, the importance of PI for effective

change management needs to be verified. Gill (2001) importantly points out that certain political facets of an organizational change initiative such as self-interest and shifts in power and influence can be a cause of failure of a change initiative, yet his leadership model overlooks the political aspects of change and focuses on the cognitive, spiritual, emotional and behavioral dimensions and necessities of change only.

PI gains weight to the extent that in order to bring successful change, leaders must be able to influence others in the organization and be able to recognize the stakeholders in change and initiate ways to influence them aptly for the change. However, leaders may shy away from the reality of PI, and therefore from its usefulness; this is so because the word 'politics' bears certain negative implications such as selfish exploitation. At the same time, leaders may exemplify positive organizational politics and so lessen the dysfunctional side of politics (Vredenburg and VanFossen, 2010). Moreover, the ability to influence others in the organization is what lies at the heart of PI and so is established the necessity of this particular intelligence in effectively bringing change in organizational settings. Hence, it is necessary to examine how PI can be deployed to effectively manage change in a dominantly changing organizational environment.

Political intelligence

Generally, the word 'politics' has an infamous undertone, especially since politicians are usually not well-regarded. However, in the perspective of change, the focus is on politics at the workplace rather than elections or parliamentary behavior. Politics prevails in every organization (Perrewe et al., 2000; Cook and Macaulay, 2004) and leaders work in politically sensitive roles (Schmidt, 2010). Although the word 'politics' bears a negative undertone and points to the 'unprofessional games' in organizations, yet researchers believe that intelligently exercising this skill is evermore essential in organizations (Ferris et al., 2000) and is certainly not about stabbing people in the back (Lussier and Achua, 2010). In the context of change, politics helps change leaders recognize the stakeholders in change and how to influence them appropriately (Cook and Macaulay, 2004). PI is generally compared with social intelligence(s) or skills, yet none of the social intelligences clearly addresses interpersonal interactions in organizational settings. PI represents a distinct social dexterity in the context of organizational settings that especially addresses influence behavior at work (Ferris et al., 2000). Ferris et al. (2008) identified the four dimensions of the political skill construct to be social astuteness, interpersonal influence, networking ability, and apparent sincerity. Peled (2000) views that a manager's ability to deploy his/ her interpersonal relationships with employees, colleagues, clients, and supervisors, defines the manager's political skill.

Scholars have used the terms 'intelligence' and 'skill' interchangeably in studies (Cook and Macaulay, 2004; Adams and Zanzi, 2005). The former have abbreviated political skill or intelligence as PQ (political quotient) and similar is the treatment by other authors. Throughout this study, the term 'political intelligence' has been abbreviated as 'PI'. In addition, coining the term 'political intelligence' has implications of the theoretical tools for various disciplines (Orbell et al., 2002). Further discussion describes these dimensions in depth and then proposes that each of these dimensions helps in facilitating organizational change effectively.

Social games

Taking an evolutionary stance, the distinct 'political brain' has evolved from our sociality, in particular, from the socio-political games that we play. Here, it is essential to distinguish PI from the Machiavellian and social intelligences. While Machiavellian intelligence specifically concerns the trickery, dishonesty, and bluff that is a part of social games, it does not involve the benevolence and compassion, which too has possibility in social games. On the other hand, social intelligence is unconcerned with conflict as well as with co-operation that are innate to social games (Orbell et al., 2002). Whereas Machiavellian intelligence employs guile and not very honorable means of leadership (Zaccaro, 2004), PI engages social as well as Machiavellian intelligence and so it has been studied by political scientists (Orbell et al., 2002).

Leaders build interpersonal relations with their interpersonal skills (Pienaar, 2009). From the political stance, two important social games are co-operation and competition and an individual may choose either. Here, two competencies work in favor of an individual's benefit in such games: the ability to manipulate, that is, to pass on such information to others that will result in acts that will be of benefit to the manipulator's self-interest and the ability is to 'mindread', that is, the ability to judge the truth of indications given by others. In addition, these two capacities of manipulating information for self-interest and reading others' minds differ among individuals. It is also interesting to note that research in the past has demonstrated strong evidence in favor of reasoning abilities specialized to the sphere of 'cheater detection' in social exchange relationships. Although cheater detection is one amongst the several political games that humans play, it is an ability that can be adapted. In fact, past research has also established that there is a relation between cheater detection and role-taking, status relationships, and even memory. The ability to make one's lies believable is what has been termed as self-deception, and falls within the parameter of manipulation (Orbell et al., 2002).

In the same context, role-taking allows one to

understand others' perspectives by recognizing the dependencies, coalition needs, and alternatives that exist for others and foreseeing the outcomes of a proposed decision from an individual position. One reflects on the possible response of stakeholders and comprehending the shifts in power during a decision making process (Adams and Zanzi, 2005) and hence role-taking ability facilitates one in understanding others' views (Perrewe et al., 2000). Research on how to enhance PI is scarce, but it can be developed within limits and role playing is one way to enhance PI (Perrewe et al., 2000; Adams and Zanzi, 2005).

People who are politically intelligent are good at negotiations, and negotiations are helpful during change, as they enable the leader to gain buy-in from those with vested interests (Cook and Macaulay, 2004). In fact, besides deal-making and exchanging favors with others for an aim that exemplify acts of PI, negotiations or bargaining also symbolize the politics that exists in organizations (Ferris et al., 2008; Lussier and Achua, 2010). To negotiate effectively, parties must have mutual respect and also realize the rules of give and take, opt for what is desired and what can be exchanged for it (Cook and Macaulay, 2004). Likewise, those high on PI are also certain about their ability to control social situations (Ferris et al., 2000). Moreover, being high on self confidence, their confidence is not related to the self only but extended to their interpersonal relations as well (Ferris et al., 2008). In the specific context of organizations, this confidence generates a positive and optimistic attitude and manner in them, leading to effectiveness in social situations at work as well as affecting change in organizations (Ferris et al., 2000). In addition, the politically intelligent are not only capable of behaving appropriately in social situations at work, but are also capable of behaving in a manner that is apparently sincere; apparent in that they can conceal manipulative intentions if any (Ferris et al., 2000, 2008).

Ingratiation, which is defined as flattery, complimenting, and offering support to others so as to influence them, enables the actor to appear loyal and sincere for the person whom he/she intends to influence. PI also helps leaders in recognizing the stakeholders involved in change and how to influence them effectively (Cook and Macaulay, 2004). Plainly, the concerns of stakeholders need to be addressed first in order to influence them.

It is interesting to note that PI includes the ability to network well, which is forming informal as well as formal coalitions (Adams and Zanzi, 2005). In fact, networking is a dominant activity that successful managers engage in and includes socializing and politicking. Consequently, it requires effective social and political skills (Ferris et al., 2000). Reasonably, building vast network of relationships and ties across the organization allows one to create circumstances for agreement amongst persons, hence fulfilling goals and accomplishing synergy (Perrewe et al., 2000; Ferris et al., 2008).

We propose that the social games of co-operation, competition, manipulation, mindreading, role-taking, exchanging favors, controlling social situations, appearing sincere, and networking well, help leaders manage organizational change.

P₁: Adeptness at social games helps leaders in managing organizational change effectively.

Power dynamism

Political behavior usually refers to the acquisition, development, and use of power in relation to other entities, where power is viewed as the capacity of social actors to overcome the resistance of other actors (Boddewyn and Brewe, 1994). It has also been defined as the daily mechanism of social existence with the ability to influence behavior and change events (Adams and Zanzi, 2005). PI requires the leader to possess either formal or informal power base and use it to exert influence. Thus, power which is exercised without PI fails to exert influence (Perrewe et al., 2000). Hence is highlighted the importance of weighing up power dynamics or vulnerabilities for a 'politically intelligent' decision. Power dynamics are products of the way people think and act in organizations (Kleiner, 2003), though these are not apparent to all – apart from the natural politician. As organizations become more political, the need to understand power dynamics is enhanced. Since traditional concepts of authority and line of command have weakened, managers tend to employ political deals to fill this power vacuum. It is also interesting to note that a new power holder has to meet with the resistance posed by existing power holders and that happens over a considerable time period (Adams and Zanzi, 2005), and that power is a relative concept as it is determined by the inequality of relationships (Weissenberger-Eibl and Teufel, 2011). In fact, it is the exercise of power in organizations that makes them what literature refers to as 'political arenas'.

As such, they are characterized by the exercise of power and influence (Ferris et al., 2000) vis-à-vis awareness of power bases and understanding sources of power. Therein, it is the politically intelligent leader who is aware of how to gain and use power (Lussier and Achua, 2010). It is essential to note that PI is not about the abuse of personal power, as those who are politically intelligent do not work for personal benefit but for the benefit of the organization.

Hence, power dynamics enables those who want to bring about change in the organization to gain buy-in to change by being aware of and building power bases (Cook and Macaulay, 2004).

Reputation is really a political concept and it has been argued that PI enables persons to effectively develop and sustain 'good' reputations. Hence, it holds that politically

intelligent leaders are astute and calculating about their personal investments and aspire to enhance success (Ferris et al., 2000). Arguably, reputation can also help in affecting organizational change through the leader's reputational capital. Since investment in one's reputation leads to success in job or career, we include reputation in the sub-dimension of power dynamics.

Power is a notion that needs to be clearly understood in order to act effectively in organizations (Kleiner, 2003). Bradshaw-Campbell and Murray (1991) have highlighted an innate power structure in their study that is embedded in games of language – gestures, myths and even humor. These highlight the components of politics – the leader may gain power or the lever to influence through the use of language games for fulfilling aims. Again, power bases need to be assessed before playing games of the language to exercise influence. Since the structural elements of politics are defined through the use of language, information, metaphors, symbols, myths and humor, then it may be argued that politically intelligent leaders are aware of how to use language, information, and humor to their advantage. This is consistent with the views of Orbell et al. (2002) who suggest that information is manipulated by the politically intelligent for their advantage – specifically to affect change; hence power is exercised over the powerless even without their knowledge (Bradshaw-Campbell and Murray, 1991). Moreover, apart from the traditional bases of power, the inter-unit dependency that has emerged in organizations as a consequence of complexity in the environment too, is a power base. While defining power in terms of dependency, an actor would have power over another actor to the extent of the latter's dependency upon the former, whereas this dependency can be for resources or for defining problems and solutions (Adams and Zanzi, 2005). Moreover, upwards appeal (Cook and Macaulay, 2004; Ferris et al., 2008) also assigns power to an actor; if an actor is difficult to convince, the other actor can overcome his resistance by influencing his boss.

Thus, we propose that power dynamism that comprises of overcoming others' resistance, awareness and understanding of power bases, reputation, using language, information and humor to derive benefit, inter-unit dependency, and upwards appeal help leaders manage organizational change effectively.

P₂: The leader's understanding of power dynamism helps in affecting organizational change.

Political persona

While studying political behavior from the bio-cognitive perspective of humans, Peterson (1985) asserts that situational factors are often overlooked while arriving at conclusions about behavior. Since situational factors relate to the political side of decisions, (Adams and Zanzi,

2005) they gain weight while studying PI. Moreover, since PI has to do with interpreting the political situation in the organizational milieu (Cook and Macaulay, 2004), the ability to read or interpret the situation is significant. Thus, the role of the situation in drawing political judgments has also been discussed in literature (Marcus et al., 2005). To describe politically relevant personality traits and behaviors, it may be argued that the underlying political psychology of leaders, political as well as managerial, can be expected to be at least comparable. Hence, the content and style of political decision making is influenced by the elements of motives, beliefs, decision style, and interpersonal style that may be applied to the realm of PI in light of the above argument. From the motives and beliefs standpoint, politically intelligent leaders work with integrity for the collective good of the organization rather than for individual benefit (Cook and Macaulay, 2004). Hence they are altruistic, focus on the good of the organization and are not selfish. Whereas, inter-personal style defines the manner in which people relate to others, specifically how their dealings, deliberate or not, affect others as well as their underlying attitudes and how they cater to their own needs through others (Immelman, 1993). Notably, the politically intelligent have a distinct interpersonal style that is appealing (Ferris et al., 2000) and that enables them to grow while working with and through others (Perrewe et al., 2000). Indeed, the leaders of today openly connect with others, proactively seeking change to improve things (Ng, 2011). Such leaders view interpersonal interactions as carrying prospects, and in turn are able to inspire trust and confidence in others. Owing to the interpersonal influence capability of the politically intelligent, they have an overpowering persuasion ability, which has also been referred to as 'flexibility' (Ferris et al., 2008). This makes sense as politics is a game of language and persuasion (Hillygus, 2005). Hence, to be able to persuade with success, one must be able to use one's language skills for one's aim. One concludes therefore, that to influence others, the actor's communication - of which language, tone and words are an important part - must be fitting with the preferred impact as incongruent messages are sent to others if the impact and intention are different (Cook and Macaulay, 2004).

Interestingly, a proactive nature has been found to be relevant to political skill (Ferris et al., 2008). The focus of the politically intelligent is proactive, which helps them in managing change (Cook and Macaulay, 2004). Thus, we contend that proactive nature is an attribute of politically intelligent leaders. The locus of control concept tells about an individual's attribution of rewards and punishments to either self (internal locus of control) or others (external locus of control). Past research provides evidence that individual with an internal locus of control perceive more social support, are skilled at influencing others, initiating social relationships, etc. Further, the internals develop enhanced relations with their

supervisors, have more favorable work outcomes, and positive social experiences. Thus, locus of control has been shown to relate with political skill (Ferris et al., 2008).

Focused attention gains importance here since it helps the leaders in understanding the stances of stakeholders as well as in recognizing and identifying the information revealed via symbols, conduct and remarks (Liu et al., 2007). Therefore, it may be argued that politically intelligent leaders have the ability to keep their attention focused.

We propose that a political persona that comprises of the ability to interpret a political situation, persuasion, using language to one's benefit, pro-active focus, internal locus of control, and focused attention ability help leaders in affecting organizational change.

P₃: The leader's political persona contributes to affecting organizational change.

Effective stress management

Politically skilled leaders are capable of working with flexibility in changing environments, especially which implicate stress. PI has been rendered as being an antidote to stress at work. While sources of stress at work may be rising competition, scarcity of skills and resources, and varying technology, PI allows for a certain interpersonal control that helps prevent stress and manage things successfully. Additionally, those high on PI believe they can make effective use of resources. Such individuals have a sense of confidence and they predict success for themselves. Their confidence extends to controlling impressions and interactions at work. In fact, stress at work is reduced for them as they enjoy showing their political skill. Arguably then, the ability to effectively manage stress at work characterizes an individual's PI, which reduces strain (Perrewe et al., 2000).

We propose that effective stress management that comprises of interpersonal control, belief in effectively using resources, confidence in controlling impressions and interactions, helps leaders in affecting organizational change.

P₄: The leader's effective stress management ability helps in affecting organizational change.

Practical knowledge

Tacit knowledge pertains to the individual and is difficult to verify (Alwis and Hartman, 2008). It is action-oriented relevant knowledge that allows people to achieve goals they personally value; one acquires this knowledge on one's own, it is procedural and relates directly with one's goal. Moreover, it is the knowledge one acquires without

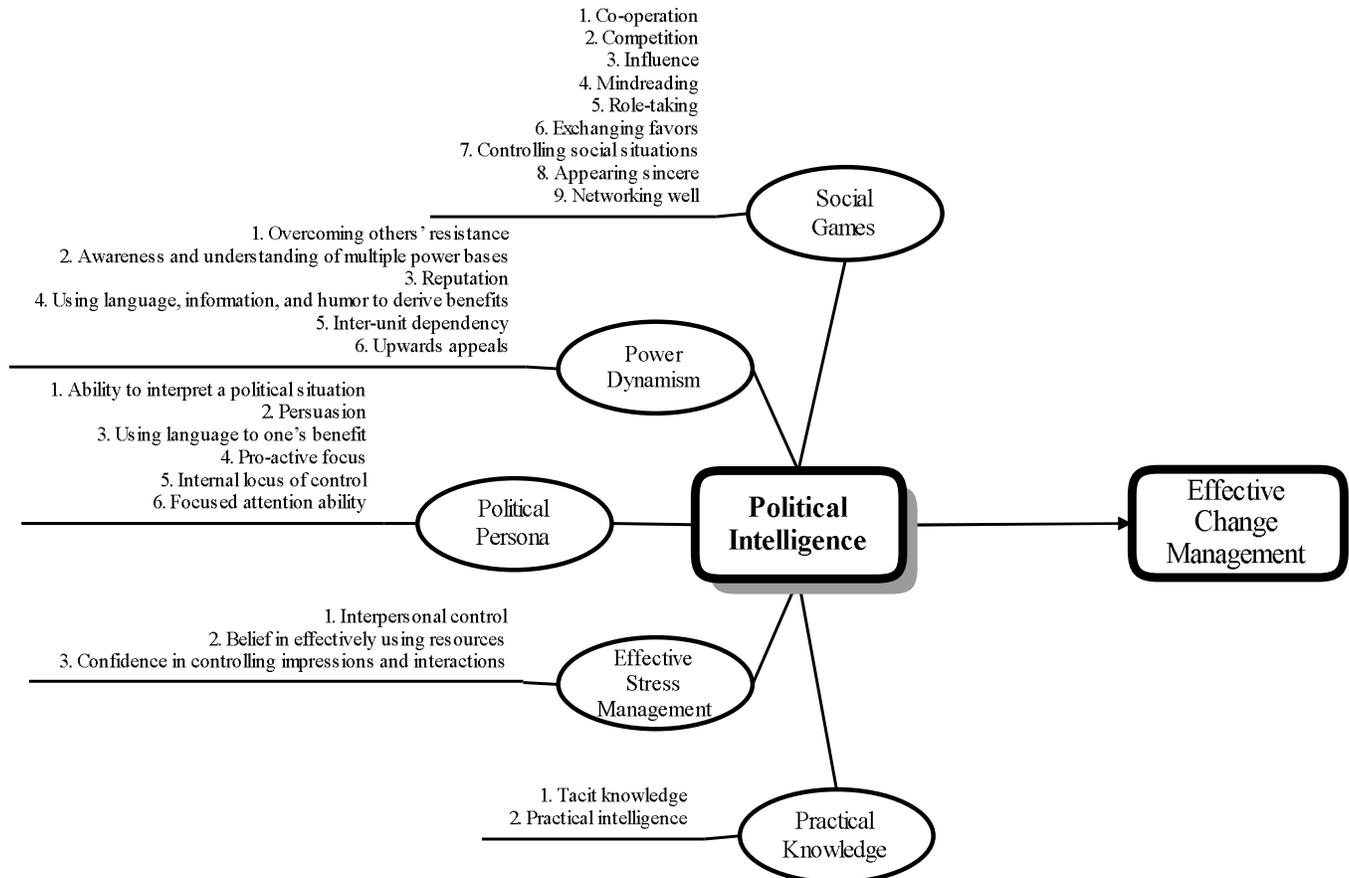


Figure 1. The proposed research model depicting relation between PI and effective change management.

being aware and guides people's behaviors and certainty in those behaviors (Alwis and Hartman, 2008; Janson and McQueen, 2007), whereas, practical intelligence is about counting on the implicit guidelines at work (Ferris et al., 2000). Moreover, tacit knowledge has been deemed important for leadership (Janson and McQueen, 2007). Since it has been advised that in order to build PI, managers must recognize potentially conflict-laden exchanges and then develop and prepare political responses; from reason, this requires tacit knowledge (Perrewe et al., 2000). Given that tacit knowledge relates to practical intelligence and both tacit knowledge and practical intelligence relate to PI (Ferris et al., 2000), arguably then, tacit knowledge and practical intelligence form part of the PI construct.

We propose that practical knowledge, which comprises of tacit knowledge and practical intelligence, can help bring organizational change.

P₅: Practical knowledge of the leader helps in affecting organizational change.

The proposed research model

Following exploration of pertinent literature, we propose a

research model (Figure 1) that attempts to study the link between dimensions of PI and their relative importance for managing organizational change. On the left side are dimensions of PI that are proposed to be helpful in effectively facilitating change.

The political theory of organizations views that human activity revolves around negotiating, forming coalitions, game playing, power struggles, and differences in interests (Pondy, 1966; Schirmer, 2007). Decisions made in organizational settings are political in nature and are made so as to achieve a desired result (Gray and Ariss, 1985). Change in particular, entails political pursuits as it disrupts the status quo (Agboola and Salawu, 2011). For change leaders, it implies that to promote change in an organization, power assessment is essential to grasp the political side of things (Adams and Zanzi, 2005). Specifically, change leaders use PI so to manage change in the preferred manner (Ferris et al., 2000). Moreover, though politically intelligent leader may employ differing approaches to bringing organizational change – from flattery and exchanging favors with others, to using upwards appeal and forming coalitions, to logically arguing for the management of change, yet their underlying motive is to bring organizational change (Cook and Macaulay, 2004).

We have rendered power as being a crucial feature in organizations and have therefore described its importance. Hence change leaders need to contemplate the aspect of power when considering resistance to change (Cook and Macaulay, 2004). Power has been defined as a skill for changing events and is certainly not about misuse. It may be argued then, that change leaders can skillfully use power effectively to alter events. Moreover, aptly using power can lessen resistance to change (Agboola and Salawu, 2011). Since the motives of the politically intelligent are to work for organizational benefit, power can be used to bring organization change with success (Cook and Macaulay, 2004). Owing to the fact that power is unequally distributed in organizations and those holding power have different interests, it holds that change leaders can have their views accepted by others by exercising influence to bring organizational change. By analyzing and achieving social leverage within organization settings, change leaders can bargain and exert influence to lead change. Likewise, the more the power imbalance, the more the reliance upon decisions through influence and forming social coalitions during change (Gray and Ariss, 1985). Considering the contemporary turbulent environments that are characterized by downsizing, restructuring and redesign, and rapid technological change (Perrewe et al., 2000) there exist a competition for important and scarce resources of the organization. Here, one significant power base is achieved via the skill to deliver or manage resources. This power base includes the reputational aspect as well (Adams and Zanzi, 2005).

In the context of change, PI can help change leaders in reducing negative social outcomes such as conflict (Cook and Macaulay, 2004; Adams and Zanzi, 2005) and hence ease the change process. Social adaptability is also boosted by PI that enhances the capability to work in changing work settings, whereas the confidence in one's ability to control social situations at work leads to an optimistic, assured manner that logically helps change leaders in being successful in bringing change (Ferris et al., 2000). It is therefore strongly indicated that PI is a necessary skill for change leaders in that it gives support in decision making through assessing the environment (Cook and Macaulay, 2004). Moreover, change leaders may resort to manipulation tactics to foster change when other options have failed or are unfeasible (Agboola and Salawu, 2011).

Executives continue to face more stress, given the intensified competition, scarce skills and resources, and added responsibility (Perrewe et al., 2000). Simply, the ever-changing environment has created stress for change leaders and PI is really a mechanism that serves as a remedy for the post-change stressful work environment. The more change an organization experiences, the more the predicted level of stress for those undergoing change. This is especially true for the stress that ensues from role conflict, which is an in-built outcome of change. The implication for change leaders herein is that PI helps

in coping with stress, enabling them to survive in a highly changing environment.

DISCUSSION

This paper was aimed at presenting a theoretical model of the organizational leader's political intelligence to conceptualize the role of political intelligence in effectively managing organizational change. We reviewed relevant approaches to political intelligence to build our model, which is based on the dimensions of political intelligence identified in light of literature, while the chief proposition was that political intelligence can help facilitate organizational change.

Though there have been studies that have related the two streams of organizational politics and organizational change (Gray and Ariss, 1985) our study proposes that dimensions of PI are valuable in predicting the effectiveness of organizational change. Additionally, the conceptualization of PI is not totally new. Ferris et al. (2005) identified four dimensions of the political skill construct to be social astuteness, interpersonal influence, networking ability, and apparent sincerity. They initially developed and validated political skill (Ferris et al., 2005), and then refined the same and further validated it (Ferris et al., 2008). Our five-factor model of PI measures the construct from the change leadership perspective, on basis of dimensions established in light of relevant literature of PI with the aim to build theory, as pointed out earlier. As per our definition, our five-factor model of PI comprises of adeptness at social games, power dynamism, political persona, effective stress management, and practical knowledge.

IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

Implications that result from an enhanced scholarly understanding of PI, and specifically how PI relates with effective change management are several and exist for scholars as well as for practitioners. For the organizations, an increased understanding of PI enhances organizational success, lessens anxiety, and improves external relationships. For organizational leaders, the implications is that with change as a persistent phenomenon, it becomes even more necessary for them to develop their skill to read employees and be capable of persuading them to act in ways so as to meet organizational objectives. Politically intelligent leaders have the ability to enhance their team's performance (Ferris et al., 2005). Adams and Zanzi (2005) provided the implications of PI for organizational decision making, and suggested its implications for and career planning. As for employees, we believe that PI is essential for those who aspire to thrive in organizations. Specifically, PI helps the employee in understanding the dynamics of power, conflict, and values during change ((Waddell et al., 2000).

A limitation of this paper is that it does not offer empirical evidence for the research model it suggests, since it employs theory-based exploration of the literature. Moreover, empirical research is essential to examine the role of PI in effective change management. Research in organizations where change has recently occurred, or is a persistent happening, can address whether their leaders use PI in facilitating effective organizational change. Empirical research should focus on testing the propositions put forth in this paper. Confirmation of the suggested propositions in an empirical investigation would provide evidence for the present conceptual framework that our study suggests. Moreover, since PI can help achieve flexibility in terms of resources and demands, thereby reducing conflict, future research needs to investigate if PI reduces conflict in organizations since change situations carry conflict.

Conclusion

This paper has demonstrated how change leaders may use their PI to facilitate organizational change – an issue overlooked in literature. We have proposed a model that addresses effective change management as an outcome of the leader PI. Our research model has conceptualized PI and offered relationships between dimensions of PI and effective change management. We respond to relevant and important views as those of Agboola and Salawu (2011), that organizational change in particular involves political pursuits, while the leader's responsibility during the change process is a test (Yukl, 2007). In addition, our research puts forth an agenda for empirical research to focus on the issue. Change leaders must exhibit adeptness at social games, grasp of power dynamism, have a political persona, be capable of effectively managing stress, and expend practical knowledge, in order to effectively manage organizational change. PI is an important leader intelligence that is short of attention in literature, and this paper has emphasized the significance of PI for effective change management. Leaders may be provided with PI through training and workshops to create awareness of, and enhance their PI skills. In addition, human resource managers may prefer to identify change leaders who are high on PI, while training may be imparted to those executives who are low on PI. These efforts would help ensure maximal performance of organizations, given the reality and persistence of organizational change.

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Full Length Research Paper

Is innovation performance of private schools better than public schools'?

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Public schools in Taiwan are bureaucratic organizations. Funds, personnel matters or regulations in private schools are more flexible. Some literatures indicate that bureaucratic organization would not lead to organizational innovation. This article selects 375 teachers in 25 public and private technical institutes and universities in Taiwan as the targets and conducts questionnaire survey. There are 335 valid questionnaires returned and valid return rate is 89.3%. The result shows that public and private schools are not the influenced factors on organizational innovation performance of the schools. Through simple regression analysis, support leadership, creative organization culture and organizational learning would positively influence organizational innovation performance of the schools. However, the result of hierarchical regression analysis demonstrates the influence of support leadership on organizational innovation performance of the schools. Creative organization culture reveals partially mediating effect. The influence of support leadership on organizational innovation performance of the schools is based on two mediating variables (organizational learning and creative organization culture). Thus, organizational innovation performance of the schools is unrelated to school attributes; instead, it is associated with creative organization culture and organizational learning.

Key words: Organizational innovation, creative organization culture, organizational learning, bureaucratic organizations, technical institute, university.

INTRODUCTION

Due to the change of demographic structure and few children phenomenon in Taiwan, the number of school children significantly reduces. Moreover, upon the government policies, most of the junior colleges and institutes of technology increase the departments and classes, or strive for upgrading and reform. In such competitive market mechanism, how to be creative and stand out become the key advantages of the schools. In the

era of knowledge economy, creating innovative climate and environment becomes the critical issue of school development.

The innovation means that the companies need to introduce new ideas, products, services, systems, policies, programs, and processes before other firms in the market (Montes et al., 2005). Innovation can be defined simply as "a new idea, method, or device" or as "the process of introducing something new" (Gopalakrishnan and Damanpour, 1994). It often describes in terms of changes, what a firm offers the world (product/service innovation), and the ways it creates and delivers those offerings (process innovation) (Francis and Bessant, 2005). Thus, the process to carry out organization

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reform and create new value is called organizational innovation (Glynn, 1996). The school is a kind of organization. However, how can "innovation" in schools be enhanced? According to the research finding of McEvoy and Welker (2000), organizational air would influence the interaction among the faculty, teachers and students, and it would affect their support for the schools and their commitment to the goals. Hanna (1998) indicates that innovation would enhance the ambience of the schools. Sawyer (2006) suggests that developed countries can transform their curricula to emphasize innovational teaching. How to encourage the teachers to participate in the instruction openly and attentively, enhance instruction innovation, administration innovation and learning innovation, further enhance overall performance of the schools and meet the coming and demand of knowledge economy time (Huang, 2005), becomes the keys of organizational innovation in technical institute and universities in Taiwan. School affair operation includes strategy, instruction, research and administration support. Organizational innovation ability is the key factor on organizational innovation performance. In order to promote innovation, the schools must rely on their innovation ability. School organizational innovation aims to enhance school performance and develop the features to accomplish the goal of school education (Li, 2005). Thus, school efficacy should be enhanced by proper thinking, leadership, and administration. In US, Daft and Becker (1978) demonstrate that the types of school innovation include education innovation and administration innovation which refer to instruction and curriculum innovation and administration management innovation. The former is based on the teachers (from bottom to top). When the teachers are more professional, they would tend to propose instruction and curriculum innovation. Thus, education performance should be strengthened by instruction and curriculum innovation; the latter is upon administration personnel (from top to bottom) who influence school organizational innovation by administration management. The schools aim to provide new learning and stimulation for the students in order to cultivate the students' new value and operate the schools upon organizational innovation indices. As to the instruction, the teachers can lead to more learning efficacy for the students and stimulate them; the students can also learn the skills and innovation ability. For the schools or the students, the operation upon innovation would highlight the features of the schools.

No organization would admit to ignoring learning. Learning is at the heart of organizations and has become the essence of productive activity. Organizational learning requires a series of characteristics allowing organization to develop the learning processes and, ultimately, become intelligent organizations (Montes et al., 2005). Wolfe (1994) suggests that organizational innovation would be influenced by individuals, organizations and environment. For leaders who can directly fetch

new ideas into an organization, set specific goals, and promote innovation initiatives from subordinates, the leadership has been addressed as one of the most important individual influences on company innovation (Aragon-Correa et al., 2007). Many researchers are concerned about analyzing whether specific managerial properties influence organizations, while others have focused on analysis of organizational factors (Aragon-Correa et al., 2007). This article wants to discuss the simultaneous influence of both kinds of factors.

Bureaucratic organizations aim to follow the regulated procedures and they involve the characteristics such as control, centralization and formalization. In early study, bureaucratic organization was thought as low innovative capacity (Thompson, 1965). Many researchers confirmed that bureaucratic organization would negate organizational innovation (Adler and Borys, 1996; Damanpour, 1996; Raub, 2008). The public universities in Taiwan are restricted by personnel matters, budgets, rules and systems of the government, and they tend to be inflexible and are considered as bureaucratic organizations. On the contrary, private schools are more flexible in terms of funds, personnel matters or rules. Thus, comparing with public universities, private universities are more likely to construct the environment of organizational innovation and result in better innovation performance. Thus, can organizational innovation performance of private and public schools in Taiwan simply be explored by organizational types? It would rely on further study.

The objective of this article is to further examine the relationship among support leadership, creative organization culture, organizational learning, bureaucratic organization and school innovation performance.

FRAMEWORK AND HYPOTHESES

The influence of support leadership on school innovation performance

Leadership can influence others' behavior and allow others to accomplish their tasks. Upon individual aspects, Chuang (2005) suggested that the characteristic of innovational organization emphasizes the importance of key person and the cultivation of individual creativity. Key person include the leaders, change agents and idea champions. Many literatures demonstrate that leadership would influence organizational innovation (Aragon-Correa et al., 2007; Harbone and Johne, 2003; Mcdonough, 2000; Sethi, 2000). Sun (2005) reported that the principals' leadership in institutes of technology would influence organizational efficacy. Montes et al. (2005) indicated that Spanish firms support leadership and encourage organizational innovation. Ouyang (2006) suggested that the leadership of military officers would significantly influence the organizational efficacy in the army. Based on the aforementioned literatures, this

study proposes the first hypothesis.

H₁: The support leadership of institute and technical university positively affects the school innovation performance.

The influence of creative organization culture on school innovation performance

Daft (2005) indicated that culture is the set of values, norms, guiding beliefs, and understandings that is shared by organization members. Shafritz and Ott (1987) suggested that organization culture refers to the members' shared basic assumptions, beliefs, values, norms and pattern of behavior. According to Wallach (1983), creative organization culture means that when the organizations encounter complicated, changeable, severe and dynamic environment, those with creative tasks, entrepreneur spirit and ambition tend to be successful, value the members' challenge and innovation and allow the members' risk culture. O'Rielly et al. (1991) suggested that creative organization culture means to promote the reformed organizations which undertake the risk. Cameron (1985) indicated that the work environment of creative organization culture is more open and the firm values employee innovation, involves high degree of support and trust, values the employees' individuality, allows adventure and mistakes, and accepts risk and reform.

Higgins (1995) proposed the concept of innovation equation and suggests that creativity and organization culture are the factors which include personnel, structure, climate and culture, and environment. Improper organization culture would reduce the members' innovation thoughts and concepts and further affect the dynamics of organizational development. Cameron (1986) suggested that the schools in higher education with high organizational efficacy involve the organization culture upon innovation and reform. Sun (2005) reported that organization culture in technical institutes would influence the organizational performance. Based on aforementioned literatures, this study proposes the second hypothesis.

H₂: The creative organization culture of technical institute and university positively affects the school innovation performance.

The influence of organizational learning on school innovation performance

Due to environmental change and high degree of technology development, the organizations involve the changes and uncertainty. In order to respond to environmental change, the organizations must enhance their competitiveness by learning. Organizational learning is based on the past experience and is the process to construct new

organizational behavior upon changeable situations in order to improve organizational efficacy (Leithwood et al., 2001).

In order to establish rapid learning and maintain competitive advantages, the schools should effectively manage knowledge, save and operate knowledge, and carry out knowledge. Montes et al. (2005) suggested that numerous organizational learning models have been successfully applied to the innovation.

Tsai (2001) found that organizational learning ability can decide the organizational absorption of new knowledge and it would significantly influence organizational innovation.

According to Tusman and Nadle (1996), the depth and breadth of organizational learning would affect the degree of organizational innovation. Stata (1989) demonstrated that organizational learning would allow corporate innovation to become the sustainable source of competitive advantages. Bessant et al. (1996) suggested that organizational innovation ability was accumulated by organizational learning.

By learning and creative thinking, the team would enhance organizational performance. With organizational learning, the members would recognize the cause and result of innovation and their behaviors and values would also be enhanced.

Organizational innovation is more likely to be implemented (Swieringa and Wierdsma, 1992). Therefore, this study proposes the third hypothesis.

H₃: The organization learning of institute and technical university positively affects the school innovation performance.

The influence of creative organization culture between support leadership and school innovation performance

High-level managers significantly influence organization culture. The research of Firestone and Wilson (1985) argued that more successful and efficient principals would tend to value administration and instruction organization culture upon communication, negotiation and cooperation. Montes et al. (2005) indicated that Spanish firms support leadership and encourage organizational learning and organizational innovation. Ouyang (2006) suggested that leadership of military officers and military organization culture significantly influences organizational efficacy. Sun (2005) found that leadership of the president in technical institutes would influence the school organization culture and further affect organizational efficacy.

Thus, this study proposes the fourth hypothesis.

H₄: Creative organization culture has a mediating effect on the relationship between support leadership and school innovation performance.

The influence of organizational learning between support leadership and school innovation performance

A support leadership is needed that enables all the organization members to contribute, with all their capacity and inventiveness, toward the creation of ideas that generate a greater strategic potential (Montes et al., 2005). Support leadership means that the leaders set up the goals by management techniques and accomplish collective participation by communication to develop the subordinates' successful experience and confidence. Leadership is a significant variable affecting organizational effectiveness (Davis and Luthans, 1979). All organizations should plan future development direction and vision by leadership and leaders' functions. Leithwood and Louis (1999) stressed that organizational learning in the schools can allow the teachers' participation by collaborative leadership. Different management style would affect organization's ability to innovate and learn (Lemon and Sahota, 2004). Montes et al. (2005) suggested that the leader must support and encourage innovation, individual initiative, through the construction of competences centered on learning. Thus, this study proposes the fifth hypothesis.

H₅: The organization learning has a mediating effect on the relationship between support leadership and school innovation performance.

The influence of bureaucratic organization on school innovation performance

Bureaucratic organization is considered as the efficient and organized model. However, it tends to take the legal and reasonable control for granted and it cannot be challenged. By work division, horizontal, hierarchical, professional and non-human measures, it constructs the ruling relationship from top to bottom. By such authority, the rulers compel their will on the employees and attempt to avoid any resistance or revolution by emphasizing control and stability. However, the control significantly reduces the members' creativity and change in bureaucratic organization and it cannot meet the changeable society. The public universities in Taiwan are restricted by personnel matters, budgets, rules and systems of the government and they tend to be inflexible and are considered as bureaucratic organizations (Sun, 2005). On the contrary, private schools are more flexible in terms of funds, personnel matters or rules. Thus, comparing with public universities, private universities are more likely to construct the environment of organizational innovation and organization learning, and result in better innovation performance. Thus, this study proposes the sixth hypothesis.

H_{6a}: Public/private of institute and technical university moderating effects of organization learning and school

innovation performance.

H_{6b}: Public/private of institute and technical university moderating effects of creative organization culture and school innovation performance.

METHODOLOGY

Sample

A questionnaire was used for data collection. This study treated 25 public and private technical institute and university in Taiwan as the targets, and invited one teacher in each school to distribute 15 questionnaires to the full-time teachers. There were a total of 375 questionnaires distributed, and 338 questionnaires were returned. Among them, there were 335 valid questionnaires. The valid return rate was 89.3%. As to the background of the samples, 122 teachers worked in public schools (36.4%), 213 of them worked in private schools (63.6%); 175 teachers worked in universities of technology (52.2%) and 160 of them worked in institutes of technology (47.8%); there were 231 male teachers (69.0%) and 104 female ones (31%); 55 of them had teaching years less than five years (16.4%), 99 of them had teaching years from 5 to 10 years (29.6%), 87 of them had teaching years from 10 to 15 (26.0%) and 94 of them had teaching years of more than 15 (28.1%).

Instrument

Support leadership means having a leader who possesses a series of transformational characteristics, including being a good designer, master, mentor, challenger, catalyzer and integrator (Montes et al., 2005). In other words, the leaders should have communication and negotiation abilities, properly support the subordinates, and value different opinions. The items are based on the research of Montes et al. (2005). A 5-point Likert scale with 4 items on the support leadership, including the supervisors' good communication and negotiation abilities, the supervisors' acceptance of different innovation opinions, positive communication and the supervisors' respect and support for the employees' creativity at work.

Organizational learning means that in the schools, in order to respond to the change of external environment, the supervisors encourage the members to accept the idea of innovation, value the teachers' innovative contribution, provide proper feedback and construct the learning mechanism to support the teachers. Upon Amabile et al. (1996), Woodman et al. (1993) and Tsai et al.'s (2001) research, a 5-point Likert scale with 14 items asks the respondents on the organization learning, including: the schools allow the teachers to have advanced studies, encourage the faculty to participate in innovative learning, value information collection, new knowledge acquisition and exchange, encourage innovative thinking, pay attention to the teachers' suggestions for creative teaching and the opinions of related units, encourage the teachers to show their creativity and solve the problems at work.

Based on Walach (1983) and O'Rielly et al. (1991), this study suggests that creative organization culture means that the departments of the organization operate actively and encourage the teachers to try the creative and lively approach by innovative work process. A 5-point Likert scale with 14 items asks respondent on the creative organization culture, including: the school aims to enhance the performance and encourage the teachers to show their creativity by continuous reform, the faculty can recognize and accept innovation vision and target, the school emphasizes the innovative thinking style and managerial concept and the school encourage the members to construct the shared values and beliefs of innovation and creativity.

Organizational innovation means that the schools deal with or change the school affairs by new and useful approaches.

Table 1. Simple regression of support leadership, creative organization culture and organizational learning on school organizational innovation.

Variable	Model 1			Model 2			Model 3		
	β	P	VIF	β	P	VIF	β	P	VIF
Support leadership	0.730*	0.000	1.000						
Organization culture				0.822*	0.000	1.000			
Organizational learning							0.839*	0.000	1.000
Adjusted R ²		0.532			0.674			0.704	
F value		380.515*			692.445*			793.713*	
df		(1,333)			(1,333)			(1,333)	

*p < 0.05.

Innovation performances are studied by; 1) the students' learning: the students often win the prizes in national special topic or academic competitions; the students often perform well in club activities; 2) the teachers' professional development: the teachers perform well in industrial and academic cooperation; the teachers perform well in academic journals or books; the teachers perform well in the acquisition of patent; 3) curriculum and instruction: the teachers are often awarded in the instruction; the curriculum designed can highlight the characteristics of the school; 4) the resources can support the innovational improvement on administration process of the school; The school is prominent in acquiring external funds (such as grants).

Reliability and validity

Cronbach's α of support leadership is 0.9246; Cronbach's α of organizational learning is 0.9593; Cronbach's α of creative organization culture is 0.9654; Cronbach's α of school innovation performance is 0.7773. It demonstrates the good reliability of the scales in this questionnaire.

The researcher designs the first draft of the scale according to literature review and invites five experts on organizational innovation field to discuss and modify the items in order to evaluate the propriety and meanings of these items. Thus, it has content validity.

The respondent on the independent and dependent variables in this study is the same person, to avoid common method variance (CMV). According to the suggestion of Podsakoff et al. (2003), the questionnaire design in this study is based on secret approach (confidentiality of the targets' information). Thus, the targets would freely provide the answers to avoid the intentions of errors. The research purposes and names of variables are not shown on the questionnaire. The survey is first on the dependent items and then on the independent ones to reduce the targets' consistent intension.

RESULTS

Table 1 show that after simple regression analysis, support leadership would positively influence school organizational innovation (explained variance is 53.2% (model 1). Thus, H₁ is supported. Creative organization culture would positively influence school organizational innovation (explained variance is 67.4% (model 2). H₂ is supported. Organizational learning would positively influence school organizational innovation (explained variance is 70.4% (model 3). H₃ is supported.

Support leadership would influence school organizational innovation performance (model 1). However, the result of hierarchical regression analysis in Table 2 demonstrates that after including creative organization culture (model 4), the Sobel test is significant ($Z = 2.837$). Regression coefficient β of support leadership reduces. However, it is still significant and it demonstrates that creative organization culture also involves partial mediating effect. H₄ is partially supported. When organizational learning and creative organization culture are included in the model (model 5), the Sobel test is significant ($Z = 2.028$). The regression coefficient β of support leadership reduces, and becomes insignificant. Thus, it demonstrates the complete mediating effect. Thus, H₅ is supported. In other words, the influence of support leadership on school organizational innovation performance is based on two mediating variables (organizational learning and creative organization culture). That is, the leaders in technical institute and university, through creating creative organization culture and organizational learning for strengthening school organizational innovation performance.

After t-test, organizational innovation performances in public ($M = 3.622$, $SD = 0.7495$) and private ($M = 3.458$, $SD = 0.7368$) technical institute and university do not reveal difference ($p < 0.05$). Thus, it seems that the difference of school organizational innovation cannot be simply elaborated by school attributes. This study then tries to find if school attribute is the moderating factor on organizational learning, creative organization culture and school organizational innovation. Since the variables of public schools and private schools are different, according to Baron and Kenny (1986), standardized regression coefficients cannot be used to obtain the score of Fisher's r-z Transform. Thus, this study must test unstandardized regression coefficients of two sets of regression analysis by the formula given thus:

$$z = \frac{(b_1 - b_2)}{\sqrt{se_{b_1}^2 + se_{b_2}^2}}$$

Table 2. Mediating effect test.

Variable	Model 4			Model 5		
	β	P	VIF	β	P	VIF
Support leadership	0.160*	0.000	3.17	0.097	0.074	3.307
Organization culture	0.690*	0.004	3.17			
Organizational learning				0.759*	0.000	3.307
Adjusted R ²		0.681			0.706	
F value		358.163*			401.092*	
df		(2,332)			(2,332)	
Sobel test(Z)		2.837*			2.028*	

*p < 0.05.

Where, b_1 = unstandardized regression coefficients of organizational learning /creative organization culture in public schools on school organizational innovation; b_2 = unstandardized regression coefficients of organizational learning /creative organization culture in private schools on school organizational innovation; $se_{b_1}^2$ = Standard error of organizational learning /creative organization culture of public schools on school organizational innovation; $se_{b_2}^2$ = Standard error of organizational learning /creative organization culture in private schools on school organizational innovation.

After the calculation, $z = 0.914$ (organizational learning) and -0.1253 which do not reach the significance level (0.05). It demonstrates that public schools or private schools are not the moderating factors on organizational learning, creative organization culture and school organizational innovation. H_{6a} and H_{6b} are not supported. In other words, public or private schools are not the factors on organizational innovation performance. Organizational innovation performance of the technical institutes and universities should be related to creative organization culture and organizational learning.

DISCUSSION, RESEARCH LIMITATIONS, AND FUTURE DIRECTION

Upon the analysis and results, it demonstrates that except for H_{6a} and H_{6b} which are not supported, and H_4 which is partially supported, the rest are supported.

School organizational innovation would not be moderated by school attributes. Support leadership would influence organizational innovation performance and creative organization culture only reveals partial moderating effect. The influence of support leadership on school organizational innovation performance is based on two moderating variables (organizational learning and creative organization culture). The result is similar to the finding of Montes et al. (2005). Organizational innovation performance of the schools should be related to creative organization culture and organizational learning. Early studies indicate that bureaucratic organization cannot

lead to innovation (Dougherty and Corse, 1995). However, some researches do not suggest that there is only one relationship between bureaucratic organization and innovation. For instance, Damanpour (1996) from three groups of contingency variables discusses bureaucracy-innovation relationship: commonly-cited contingency factors (environmental uncertainty, organizational size), industrial sectors (manufacturing/ service, not-for-profit/ for-profit) and innovation characteristics (innovation types, stages of adoption). The result of this study demonstrates that school organizational innovation cannot be elaborated only by bureaucratic organization; instead, it should be based on support leadership, innovational culture and organizational learning.

The findings provide several implications for theoretical and managerial meanings. First of all, with regard to theoretical meanings, the past studies on the influence of leadership, organizational learning and organization culture on school organizational innovation efficacy tend to test the effect of different or extreme leadership or organization culture on a single variable. This study treats multiple variables to test the influence of support leadership, organizational learning and creative organization culture on school innovation efficacy. Thus, the validation on the influence of leadership, organizational learning and organization culture on organizational innovation efficacy would be more complete. Moreover, this study examines the influence of bureaucratic organization on school organizational innovation performance as the moderating variable and the result demonstrates that school organizational innovation performance of the schools is related to creative organization culture and organizational learning. It would not be influenced by school attributes. This probably is relevant with the education reform of Taiwan in recent years. The president of public technical institute and university is voted by the principal selects committee (the member includes faculty representative, alumni representative and persons with social good reputation), it no longer appoints by the Ministry of Education. This means that the president's power source comes from faculty and not from government. They need to create a more democratic, creative organization culture

and organizational learning environment to earn all faculties support and to get more organizational innovation performance.

With regard to managerial meaning, first of all, when encountering the complicated and changeable educational environment, technical institute and university must modify the roles of school leaders by multiple views to lead to multiple values and evaluate school organizational innovation by combined indices in order to result in sustainable progress and growth. Secondly, leadership, school organization culture, organizational learning and organizational innovation performance are highly connected. Thus, school managers can create positive organizational learning mechanism and facilitate creative organization culture by the adjustment of leaders' roles in order to enhance the efficacy of school organizational innovation. In addition, the schools can construct proper competitive situations, set up concrete objectives and lead the members to value work performance. Thus, the members would pursue the innovation and prominence. In addition, the schools should provide the innovation platform to stimulate the teachers' creative instruction. Because of the positive influence of support leadership on school organizational innovation, the school's leaders, especially the president, need to delineate the schools organization innovation vision and share these thoughts with all faculties.

Future research can extend the present study in several directions. One direction would be to replicate the same questionnaire in the college or senior high school. One could also investigate in greater depth whether more technical institute and university would facilitate. One could also conduct the same study on the other academic universities. One could also use multi-level model or structural equation model to develop this issue. Another avenue of research could examine how teachers in universities would compare with technical institute and university in school organization innovation. It could also find the organizational innovation evaluation indicators for technical institute and university. Thus, upon the recognition on current situations of the teachers in technical institute and university, this study probes into the relationship between support leadership, school organization culture, organizational learning and organizational innovation performance; however, it does not conduct the president's or supervisors' self-evaluation. Future studies can include this aspect to compare the president's or supervisors' self-evaluation and the teachers' evaluation to find their cognitive gap as the managerial criterion. Since organization culture and organizational learning are likely to change with time, it is necessary to conduct long-term vertical tracking to obtain the dynamic relationship among organization culture, organizational learning and school organizational innovation efficacy. Questionnaire survey is limited to some degree and some variables such as support leadership, organization culture and organizational learning can be further studied upon

observation and interview. Thus, future studies can involve the qualitative research approaches such as case study and in-depth interview to complete the conclusion.

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Full Length Research Paper

Stipulation of a model to establish a valuable relationship with consumers in an e-grocery

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In this research, we examine the extent of information technology and application of internet in e-commerce as a whole, and e-grocery in particular, focusing on the effective factors concerning customer values and the effects of e-grocery on consumer value in the Iranian market. This survey suggests an integrated model is designed using a combination of seven variables in shaping consumer values. The seven variables; product ID, consumer's inventory management, and 24 h service from electronic commerce, distribution channel, price and choice from grocery, and the variable of respect, which plays an important role in both categories, but in distinctive ways as noteworthy features for ranking efficient variables in generating a precious connection with customers are thoroughly studied.

Key words: E-grocery, consumer values ranking, e-commerce, Iranian market, marketing, variable normality, kolmogorov-smirnov test, Friedman test.

INTRODUCTION

The present century has been named "the population explosion century" and "the information explosion century". There are deep sited reasons to believe that "the information explosion" has made so drastic changes in the life of human beings in every aspect, that, this event can be named "information revolution" and ranks atop "the industrial revolution". This revolution has become possible by evolution of information technology and innovation of "internet". On the other hand, "the population explosion" has made the cities larger and the distances longer. This has resulted in accessibility of demands, no matter the type and form, by everybody who is in need of, in a poor and unsatisfactorily manner. Internet in its turn has made remarkable changes in the business environment and has eliminated distances between the suppliers and customers, clients and contractors, sellers and purchasers, information seekers and providers, service seekers and providers, etc. Value creation for consumers

must be placed at the focus of attention for marketers, and its factors should be identified and categorized. E-business causes diversity in distribution channels and creates values for consumers. In Iran, this type of business – and e-grocery in particular – is hastily growing.

This study is a descriptive-survey study. However, from time to time, cross-sectional survey has also been implemented. Since the present study is a collection of methods which aim to describe the conditions or phenomena under study and since the execution of this research can help understand the present situation or assist us in the process of decision-making, it is descriptive. On the other hand, part of the research is survey conducted on the sample population to interpret the attitudes, thoughts, behavior or attributes of the society. A type of study and survey of nonparametric statistical tests such as Kolmogorov - Smirnov test, Friedman rank sign test are used in addition.

The research population of this study is the consumers who do their shopping in Persian Web shop. Persian Web shop was opened in Mashhad in 1386 and offers its goods in nine categories as follows: dairy, protein, nuts, vegetables, drink, snacks, canned food, cosmetics, and cleaning and detergents. Information resources dogged

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in this investigation were the databases of Persian Web shop and interviews with its store managers.

Statistics retrieved from the databases of Persian Web shop showed that the total number of the consumers who did their purchases electronically were 420. The applied sampling method was stratified random sampling. With regard to the success of the population which is 0.5, and the degree of the error which is 7%, in this research, the populations of consumers were sampled randomly. The number of the sample population was calculated to be 196 and according to the random sampling method, the sample population was determined. Secondary sources were gathered through library studies such as studying books, data and documents. Internet was the next source. The data from these sources were used for theoretical formulations. The primary data were used to test the hypotheses of the study and using a survey study (an e-questionnaire), the sample population was interviewed.

LITERATURE REVIEW

In a study by Kau et al. (2003) under the title semiotics of "Typology of online shoppers", the attitude and behavior of Singaporeans e-shoppers were studied and investigated. The statistical population of their study was 65% male and mostly single. The largest age group was 20 to 24 years which consisted about 32% of the whole population; the second largest age group was 25 to 29 years (roughly 28.5%), while the third largest was 30 to 34 years (roughly 13.9%). Only 2% of respondents were over 50. 44.9% had college degrees. Considering the results, consumers were divided into six categories.

In a study by Ahola et al. (2003) titled "A long-term case study of an e-grocery concept", they studied the factors effecting value creation for consumers of e-groceries. They found that in order to create values for a consumer in an e-grocery, it is necessary that the potentials of internet be reasonably brought into use and also be placed into good and constructive interaction with the factors in the value chain.

In a study by Joines et al. (2003) entitled "Exploring motivations for consumer Web use and their implications for e-commerce", the results were:

1. A significant negative relationship existed between trade interactions and concerns of security and privacy (concerns about credit card frauds).
2. A significant positive relationship existed between the amount of online shopping and information motives (provision of useful and constructive information about goods and services to consumers).
3. A significant positive relationship existed between online shopping and interactive motivations.
4. A significant positive relationship existed between online shopping and social motivations.
5. A significant positive relationship existed between

online shopping and economic motivations, such as, convenience and saving of time and cost.

In a study by Raija (2002) entitled "the consumer benefits and problems in the electronic grocery store", the results showed that 43% of the consumers had stated that finding the goods was not easy; 40% stated that prices were higher than the traditional form of shopping; 34% had stated that the quality of the goods was almost impossible to verify; 28% had stated that goods were less classified than traditional stores; 12% had stated that the exchange of information had not been easy; 6% had stated that delivery had not been time-effective; 6% had stated that the goods were not returnable, and 3% had stated that the services provided during the purchase had not been satisfactory. The result was that price is an important factor in online shopping and that services provided to consumers at the time of purchase and facility of purchase take up the first and second place.

In a research by Ankar et al. (2002) titled "creating customer value in online grocery shopping", variables of price, choice, services and ease of purchase were investigated and the results showed that variables of service and price played a determining role in the consolidation of a grocery.

In a study by Ling (2001) titled "an analysis of the e-grocery industry in Singapore", variables of distribution channel, choice, time cost, payment method and cost were evaluated. These results showed that none of the mentioned variables indicated any tilt of attraction towards either traditional or electronic grocery or considering that online grocery is in its early stages of development, it is unable to compete with traditional grocery.

In a research by Kamarainen (2001) titled "the reception box impact on home delivery efficiency in the e-grocery business" points out that grocery delivery is not yet publically normalized, and perhaps, one of the main reasons is the lack of any difference in the speed of either methods of grocery. Moreover, online grocery sometimes turns out to be more costly for the consumers. In recent years, internet and online shopping have mildly facilitated the purchase process; however, there exist a lot of problems and ambiguities to which, so far, no proper answer has been found. In that article, different channels of purchase process were investigated, and efficient channels another research by Smaros et al. (2000), "reaching the consumer through e-grocery VMI". Point is made that in today's world which is full of competition, in order to win profits from our sales and maintain our commercial growth, we need to create values for our consumers; we cannot simply hand solid merchandise to a consumer without considering any meaningful and relevant side service. This side service will act as our axis to create value for our consumers. This will, in turn, lead to more profit which will ensure the survival of our organization. In addition, the created value needs to be a permanent one. The researcher examines

the demands for the goods in a grocery and suggests that with appropriate services accompanying the goods, they can increase their sales. A grocery should be able to develop a scenario to be able to meet the diverse needs of their consumers, while their marketing mix must show a high flexibility.

A consumer is any person or organization involved in the channel of distribution or decision (other than competitors) whose action can affect the purchase of the firm's products and services. It encompasses both the firm's existing consumers and those potential consumers it seeks for the future. It focuses on those persons or organizations that can influence the decision to purchase the firm's products and services. Thus, the notion of consumer is broadened far beyond the entity (person, family, or organization) the exchange money (or goods and services) for the firm's products or services (Capon et al., 2001).

The foremost of consumer value very simply states that achievement in targeted market divisions is directly related to the firm's ability to provide value to consumers. A corollary of this major is that although firms develop, produce, and deliver products and services, consumers perceive value only in the benefits that these products and services provide (Capon et al., 2001).

$$\text{Value} = \frac{\text{Benefits} = \text{Functional Benefits} + \text{Emotional Benefits}}{\text{Costs (Monetary Costs + Time Costs + Energy Costs + Psychic Costs)}}$$

Delivering superior consumer value is a means to success in a more and more cutthroat setting. From the perspective of a single grocery retailer, online or offline, consumer value can generate in four different ways, by offering:

1. Competitive price
2. A broad and/or specialized assortment
3. Superior shopping convenience
4. Superior consumer services (Ankar et al., 2002).

As Blackwell et al. (2001) shows, the winners in "clicks and order" retailing, like their forerunners in "bricks and mortar" retailing, will be those who know how to support the consumer better than competitors and offer superior solutions than were obtainable to consumers in former times. What constitute a considerable part on influencing consumer satisfaction are consumer need, consumer value and consumer cost. The technology of e-commerce determines what can be offered to consumers, but only consumers settle on which of those technologies will be accepted. The means to success for e-commerce is to be familiar with consumers' behavior, value and satisfaction. There are numerous models that have been built up to support our understanding of value that consumers expect from a given product or service (Engel et al., 1995;

As said by Kotler et al. (2000), consumer value is the consumer's opinion of the product's general capability to convince his or her needs. Consumers face with a huge group of product and brand options, fees and suppliers. It is supposed that consumers do guesstimate which offer will deliver the most value for them. They are accepted as true to be value-maximizes within the bounds of search costs and limited information, mobility and income. It is believed that consumers will buy from the firm that they perceive to put forward the highest consumer delivered value. The whole consumer value is the bundle of benefits, consumers expect from a given product or service (product value, service value, staff value, and image value). Total consumer cost is the package of costs consumers expect to incur in evaluating, obtaining and using the product or service (monetary cost, time cost, energy cost, and psychic cost). Consumer delivered value is the difference between the total consumer value and total consumer cost (Ahola et al., 2000).

Companies deal with needs by putting forth a value proposition - a set of benefits they offer to consumers to assure their needs. The intangible value proposition is made physically by an offering which can be an amalgamation of products, services, information and experience. Value is given by (Kotler, 2002):

Murphy, 2001). For example, Holbrook (1999) lists efficiency, convenience and quality of products or services as consumer value. Ravald and Gronroos (1996) list purchase price, acquisition cost, transportation, risk of failure or poor performance as consumer cost (Lin, 2003).

To quote Haddrell (1994, cited in Danaher and Haddrell, 1996), as they mention, many different scales have been considered to assess customer contentment. As stated by Lin (2003), three core scales which play a noteworthy character in determining consumer selections are as follows:

1. Consumer need
2. Consumer value and
3. Consumer cost

As affirmed by Solomon (1999), the needs can be separated beside two aspects: Utilitarian (a desire to achieve some functional or practical benefit) and Hedonic (an experiential need, involving emotional responses or fantasies) (Solomon, 1999).

A person's set of values play a very significant position in consumption activities. Many products and services are purchased for the reason that people consider these products will help them attain a value-related goal (Solomon, 1999). Values have an effect on consumers in

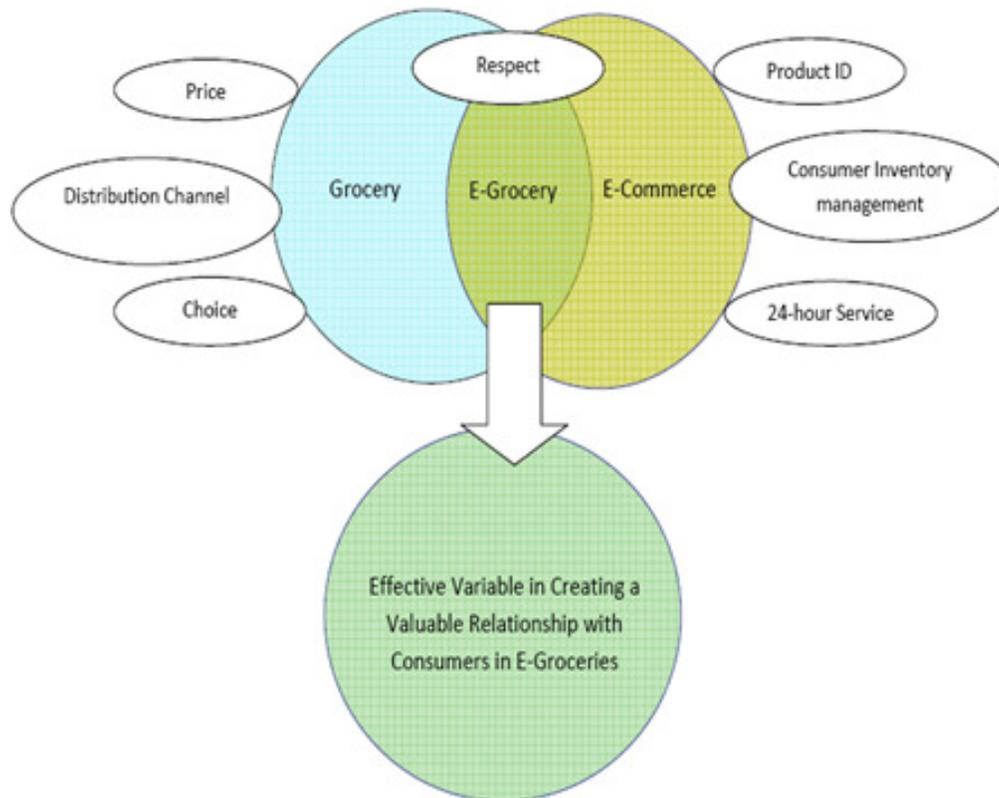


Figure1. Model variables affected in relationship with consumers in Iranian e-groceries

determining evaluative criteria, replying the question “Is this product for me?” Value can be delineated as principles or standards of an individual, group, organization or society as a whole (Kenny, 1994). They reflect an individual or collective judgment as to what is valuable or vital in life (Kenny, 1994).

In addition, values reflect what people do and what guides behavior, that is; what is done at work and how it is done reflect the values people hold (Kenny, 1994). Values can mean a variety of things to different consumers. Woodruff and Gardial (1996) argue that satisfaction and value are complementary, yet distinct constructs (Woodruff and Gardial, 1996).

As Ravald and Gronroos (1996) examine, the theories of consumer behavior research argue that “value” is continually used in a context, meaning values of consumers.

On the other hand, Peter and Olson (1993) discuss another meaning of value; “the value or utility the consumers receive when purchasing a product”. Monroe (1990) describes consumer perceived value as the ratio between perceived benefits and perceived sacrifice (Monroe, 1990).

Kotler’s (2000) meaning is analogous with Monroe’s and is gone over the main points as this judgment that “consumer delivered value is the difference between total value and total consumer cost”.

The research proposes that the following major benefits

for suppliers are involved, as witnessed by the views expressed of Kotler (2000) and Skyrme (2001):

1. 24 h and 365 day opening
2. Lower costs
3. Efficiency gains
4. Extended market reach
5. Speedy modifications to market circumstances
6. Influence consumer purchases and
7. Improved consumer service.

According to Kotler (2000) and Skyrme (2001), e-commerce also provides a number of benefits to consumers, such as:

1. Convenience
2. Information
3. Less hassles
4. Low procurement costs
5. Smooth process
6. Personal shopping and
7. Transaction can be instant.

Over 70% of the respondents reported convenience and saving time as their primary reason for buying groceries online.

The other reasons mentioned were corporeal

constraints, hatred of grocery shopping or grocery stores, buying for business, an inability to keep away from impulse buying, and the reality that the respondents do not like waiting in queue" (Tanskanen et al., 2002).

THE PROPOSED MODEL

The proposed model is shown schematically in Figure1 in an e-grocery in Iran.

Distribution channel

With people's life full of daily activities, shopping at residence will be much more economical and easier. From the customer's point of view, residence delivery is a new service that makes life easier, especially for people who have difficulties in getting to a store or who do not have time for shopping. As we exemplify in Figure1, this reality is adorned as distribution channel in this paper. In e-shopping, since stores have categorized and listed the goods and services, and it has become easier for consumers to contrast and select, much of the labors of purchase have been omitted, and much of the work which was previously on the consumer is now on the grocery store (Delany et al., 2003). Noticeably, when shopping in customary groceries, consumers would fritter away much of their time especially when they are unable to find their preferred item for consumption and have to search different sections of the store for it (Delany et al., 2003).

Convenience has been proved to be the most important factor in the expansion of e-grocery in TESCO. TESCO is an online grocery shopping and delivery service which has been mainly fashionable for its ease of purchase rather than the low price (Delany et al., 2003). From the customer's point of view, home delivery is a new service that makes life easier, especially for people who have difficulties in getting to a store or who do not have time for shopping (Morganosky et al., 2000; Kamarainen, 2001).

Price

Price is the one aspect of marketing mix that produces revenue; the other elements produce costs. Prices are the easiest marketing-mix element to adjust. Product features, channels, and even promotion take more time. Price also converses to the market company's intended value positioning of its product or brand (Kotler, 1997).

Price can be looked upon as the amount for which a product or service is exchanged, or offered for sale to potential purchases, irrespective of the value or worth (Proctor, 2000). The simulation results illustrate that e-grocery home delivery service can actually be as much as 43% cheaper to current costs of consumers visiting the store using their own car and spare time.

Baker (2000) acknowledged groceries are everyday necessities for which most consumers are loathing to pay a premium (Kamarainen, 2001). So, it is said that briefly, competing by price is the most repeatedly used method in the grocery business. Chiger (2000) says about 67% of these online shoppers agreed that convenience was the main reason they had bought through the internet with 41% mentioning price as another factor (Berning et al., 2004).

Choice

Studies attest that variety serves as a determining issue in shopping from a store. Also, choice and availability of rare-to-find products can be a momentous factor in e-commerce (Ankar et al.,

2002).

As well, search engines are so designed to make it possible for the consumers to find their precise products and services. Furthermore, there are records in which products and services are categorized, priced and their respective additional information provided. In so-doing, a wide series of users are aided in their valuation and choice of products and services (this is called comparison and search convenience). This reality is decorated in Figure1 as choice. This convenience will occasionally allow consumers to identify unrecognized substitute products which may possess finer qualities (Alba et al., 1997).

Twenty-four hour service

IT can help resolve a number of difficulties. It provides the opportunity of doing their purchases at home which helps reduce unnecessary traffic and market rush, and time of purchase (Kotler, 2000). In other words, as shown in Figure1, consumers will have a 24 h chance of purchase. The website efficiently and effectively provides necessary services and information for the consumer, and transactions and services are automatically rendered (Lin, 2002).

Respect

With an e-grocery, consumers are relived of disrespect and long queues, especially after a long working day. Since omission of a head to head communication with a frowning cashier, leading in turn to disrespect; e-commerce has proved positive to consumers (Delani et al., 2003). Daly (2002), in a report on users' respect at e-groceries, which was prepared through interview with users and investigation of websites active in the field, introduces six effective elements on respect which are:

- i. Privacy
- ii. Clearness
- iii. Principles
- iv. Responsiveness
- v. Simplicity
- vi. Attitude

Gupta et al. (1997) clarify that consumers' lack of interest in e-shopping is mostly on account of security issues and conciliation of privacy. Burke (1997) also mentions the same problem as why the majority of consumers lack an interest in making use of technology.

Product ID

Today, with the provision of a digital product ID, consumers will have the chance to virtually identify the products and obtain information on their production process from the beginning through to the store (Smaros et al., 2000). This information may consist of the kind of the meat, where the animal is raised, the kind of grass the animal is fed, where the meat is packaged, and how the meat has been transported to the grocery (Higginson, 2002). Design of such system has got advantages for both the consumers and the grocers. It is of significance to grocers because of the facility with which they can manage their supply chain process, expedite their delivery of products to consumers, manage their inventory, and avoid storing the surplus products. In addition, consumers will be able to do their purchase with more information and transparency (Rundh, 2008).

Consumer inventory management

Consumer inventory management requires a useful and

Table 1. Summary of variable normality test.

Variable	Significance	Result
Distribution channel	0.012	Non
Price	0.001	Non
24 hour service	0.000	Non
Respect	0.001	Non
Product ID	0.017	Non
Choice	0.001	Non
Consumer inventory management	0.018	Non normal

constructive relationship between the grocer and the consumer so that the grocer is able to collect and store the consumer's purchase information such as taste, habit, number of monthly purchases, etc. and design an efficient system to manage the consumer requests (Smaros et al., 2000). In other words, using consumer management inventory, consumers will know if a particular product is available, and if not, they will also know if there is any alternative product. Subsequently, every month, consumers are updated on the changes in inventory of the grocery and the alternative products (Ankar et al, 2002). Finally, the success of an e-grocery lies with establishing a constructive relationship between the consumer demands, inventory, and the quality of the provided services to the consumer (Delani et al., 2003).

RESULTS AND DISCUSSION

Gender distribution in the sample was correspondent with the research model. Majority of the consumers consisted of women, and the results portrayed the reliability of the findings. Results showed that 85% of the female consumers were over 20 years, and 80% of them earned over 7,000 dollars per month. On the other hand, 90% of the male consumers aged above 20 years, and 85% of them earned over 7,000 dollars per month. Moreover, all but 12% of the respondents had higher educations. Regarding, online shopping, 77% of respondents were in favor of online shopping, while 23% were contrasting to it. Concerning electronic shopping 71% of women showed tendencies towards electronic shopping. That is, while 56% of men had inclinations for electronic shopping, the majority of the population was in favor of electronic shopping.

Operative variable results

As for the question of distribution channel being an advantage, results showed that 36% of the respondents completely agreed, while 53% only agreed, and 11% exhibited indifference.

The results showed that 6% of the respondents completely agreed on price being economic and an advantage in e-grocery, while 32% only agreed, whilst 47% showed neutrality, and 14% opposed the notion.

On the other hand, 1% displayed strong disagreement.

30% of the respondents completely agreed on choice being an advantage in e-grocery; 45% only agreed, while 9% showed neutrality, and 4% opposed the thesis. 2%, however, displayed strong disagreement. 28% of the respondents completely agreed on 24-hour service being an advantage in e-grocery; 48% only agreed, while 15% showed neutrality, and 6% opposed the thesis. 3%, however, presented strong disagreement. 22% of the respondents completely agreed on respect being an advantage in e-grocery; 56% only agreed, while 18% showed neutrality, and 3% opposed the thesis. 1% however, displayed strong disagreement. 15% of the respondents completely agreed on product ID being an advantage in e-grocery; 32% only agreed, while 35% showed neutrality, and 16% opposed the thesis. 2%, however, put on view strong disagreement. 12% of the respondents completely agreed on consumer's inventory management being an advantage in e-grocery; 28% only agreed, while 42% showed neutrality, and 14% opposed the thesis. 4% however, flaunted strong disagreement.

Normality of the research variables

Before getting to test the research hypotheses, in order to accept the conduct of variables used for the model presented in this paper, we need to determine the normality of the research variables which are rated through the Kolmogorov-Smirnov test. The design of the hypotheses is as follows:

H_0 : The related variables is normal.

H_1 : The related variable is not normal

Based on the test results from all variables, since the obtained significance numbers were less than 0.05, the H_0 was rejected and the non normality of the variables of value creation were confirmed as is shown in Table1.

Sign test

Using sign test, the status balance of the dimensions of value creation is investigated. (Memo: since the value

Table 2. Summary of variables sign test.

Variable	Output	Z	Result
Distribution channel	5	1.65	Cause
Price	2	1.65	Cause
24 hour service	3.5	1.65	Cause
Respect	3.4	1.65	Cause
Product ID	2.2	1.65	Cause
Choice	3.2	1.65	Cause
Consumer inventory management	2.1	1.65	Cause create value

Table 3. Summary of ANOVA test.

Variable	Value
Total	196
χ^2	419.076
Degree of freedom	29
Significance	0.00

range is 1 to 5)

H_0 : The variable does not propote value creation on e-grocery

H_1 : The variable does not propote value creation on e-grocery

or:

$H_0: \mu \leq 3$

$H_1: \mu > 3$

With regard to the obtained results, as shown in Table 2, all the variables had significant relationships with value creation for consumers.

Friedman ANOVA

To rank the value creation for identifying the weak and strong points, Friedman analysis of variance (ANOVA) was used. The results are as shown in Table 3.

Value creation dimensions

Hypothesis test: there is a significant difference between the present statuses of value creation dimensions. Therefore, the following statistical hypotheses can be developed:

H_0 : There is significant difference between the present status of value dimensions.

H_1 : There is no significant difference between the present status of value dimensions.

Considering the output of SPSS (Statistical Package for

the Social Science), the significance value is less than the standard significance level ($\alpha = 5\%$). Therefore, H_0 is not validated on the 95% confidence level, and therefore, the dimensions of value creation do not have similar ranks.

Rank mean in Friedman test

As can be seen from Table 4, the highest rank belongs to distribution channel, and then afterwards, choice, 24 h service, respect, product ID, consumer inventory management and price, respectively.

CONCLUSION

The role of distribution channel in attracting consumers to electronic grocery

Results showed that 89% of consumers had either completely agreed or just agreed that distribution channel had a very decisive role in attracting them to do electronic grocery.

This was, while 11% of the consumers showed indifference none disagreed to the statement. Therefore, conclusion can be made that distribution channel has a key role in the growth and development of electronic grocery.

The character of price in attracting consumers to e-grocery

Although price has always been a concern for consumers regardless of the value they gain from a product, the concern is for the thing they get for the money they spend.

Table 4. Summary of variable rank results.

Variable	Significance	Average rating
Distribution channel	0.012	18.91
Choice	0.001	17.58
24 Hour service	0.000	17.39
Respect	0.001	16.32
Product ID	0.017	11.83
Consumer inventory management	0.001	11.40
Price	0.018	10.30

According to the study, although 47% of the respondents had shown apathy to price difference, a greater number of consumers were not willing to pay extra for their electronic purchases; they believed that, compared to traditional grocery stores, e-stores were not reasonably priced. Compared to other factors such as time, effort or respect, price proved to be a factor of higher interest in e-shopping, and can have a determining role in stimulating a consumer towards e-grocery.

The character of choice in attracting consumers to electronic grocery

As examinations showed, whereas only 8% of the respondents had (fully) disagreed with choice being a substantial factor in attracting consumers to e-shopping, 75% had (fully) agreed to the matter. Considering the percentage of the indifferent respondents, claim can be placed that choice can be a determining factor of attraction for the consumers of an e-grocery.

The character of 24 h service in attracting consumers to electronic grocery

As shown by the study, merely 9% of the respondents had (fully) disagreed with 24 h service being an influential factor in attracting consumers to e-shopping.

That was while 76% of the respondents had (fully) agreed to the statement, and since only 15% had presented their lack of difference, it could be argued that 24 h service can act crucially in drawing consumers towards e-grocery.

The character of respect in attracting consumers to electronic grocery

As the study shows, 78% of the respondents (fully) agreed e-groceries grant more respect to their consumers (for example, consumers no longer have to face bored and ill-tempered shop assistants or cashiers, or do their shopping in congested stores). Additionally, e-groceries satisfy a higher sense of prestige which acts

as an attracting element towards e-grocery.

The character of consumer inventory management in attracting consumers to electronic grocery

As shown by the examination, 40% of respondents (fully) agreed that e-grocery's consumer inventory management served as an attraction motive towards e-shopping. Because of their busy schedules, consumers often fail to check on their inventory or miss updates to alternative goods, thus consumer inventory management serves as an influential element in value creation.

The role of product ID in attracting consumers to electronic grocery

According to the study, 47% of respondents (fully) agreed that provision of a product ID is influential in attracting the consumers and that consumers could do a more informed purchase. Moreover, the results indicated that product ID has been one of the significant factors of creating value for consumers.

Consumer value rankings

With regard to the per-centage of the respondents who had (fully) agreed to the study variables, the variables were ranked as follows: (1) distribution channel = 89%, (2) 24-hour service = 80%, (3) respect = 78%, (4) choice = 75%, (5) product ID = 47%, (6) consumer inventory management = 40%, (7) price = 38%.

E-commerce and online shopping

The comparison of the conceptual framework and literature of the research along with the results indicates that the Iranian consumers approach towards e-commerce and online shopping is no different from that of other countries and along with the expansion of internet application and spreading out communication infrastructure, there is the growth of electronic commerce and online shopping.

E-grocery

Results showed that 85% of female consumers were over 20 years, among which 80% had a monthly income of over 700,000 tomans per month. It also indicated that 90% of male consumers were over 20 years, out of whom 85% earned a monthly salary of over 70,000 dollars. Meanwhile, all but 12% of the respondents had higher education. Moreover, 77% of respondents showed favor to online shopping while 23% opposed it. Lastly, whereas 71% of the female buyers had shown favor to online shipping, a mere 56% of the male buyers showed willingness. Nevertheless, the majority of the respondents had tendency towards e-shopping.

Although e-grocery is in its early stages of development in the markets of Iran and most of the consumers are young and earn an above average income, it is operating quite similarly to those of e-groceries of other countries.

Consumer values in e-grocery

Consumer values of the target population are mostly identical with those other populations. Nevertheless, consumer values are affected by economic and cultural factors. Although, these values differ in ranking from population to population, distribution channel, time, and respect possess high priorities in the countries where e-groceries are in operation.

Considering the research analysis and the obtained results, we notice that through the creation of values by e-groceries and the development of the digital world, tendency for electronic grocery will vividly increase in the near future.

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Full Length Research Paper

The impact of stakeholder communication on project outcome

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Project management demands exercise of nine knowledge areas; managing project scope, time, cost, quality, HR, stakeholder communication, procurement, risk and integration of all these. From July 2007 to April 2009, this study observes that in the IT industry working in Islamabad, Pakistan, the results of heterogeneous IT projects suffered from problems like scope creep, cost and schedule overrun and lack of customer satisfaction on project results due to inappropriate stakeholder communication management. Focusing on stakeholder communication it was hypothesized that the quality of the stakeholder communication management determines the project outcome. Adopting stratified sampling 70 heterogeneous IT projects from 24 different software houses were selected. Using a reliable instrument, data was about the quality of stakeholder communication invested by the project managers and the consequent results of the IT projects was collected in a cross sectional manner. The data was analyzed using frequency distribution, Pearson correlation and linear regression. The findings confirmed a strong correlation and dependency of project outcome on stakeholder communication. It recommended ensuring good quality stakeholder communication considering it a primary tool for determining the project's scope, time and cost. The study contributes guidelines and templates to help project managers improve stakeholder communication skills and its documentation respectively.

Key words: Project management, project stakeholder management, stakeholder communication, project communication management, information technology (IT) projects communication and management, stakeholder risk management.

INTRODUCTION

Project is a time-bound, organized endeavour for providing service(s) and producing a product. Project management is the application of knowledge, skills and tools to ensure that a given project is accomplished successfully. In order to ensure project success, the existing framework of project management advises project managers to exercise nine knowledge areas. These are management of the project's scope, time, cost, quality, human resources (HR), stakeholder communication, procurement, risk and integration. Project scope, time and cost are considered triplet constraints and primary functions of the projects. Now- a- days, quality is also considered the fourth primary function. However,

management of HR, stakeholder communication, risk and procurement are declared secondary and support functions for project management (Project Management Institute [PMI], 2009; Schwalbe, 2010). This is how the literature guides that the nine knowledge areas are not equal in priority and precedence. Although distinguishing the nine knowledge areas seems rational in the bookish context, however the reports on the real exercises of stakeholder communication for various IT projects in the IT industry of Islamabad, Pakistan provided a different picture of its significance. It is indeed the stakeholder communication through which the project's scope, time and cost are interpreted, maintained and pursued during a project's execution. As the real practices in the selected IT industry presented a view different from what literature says, the study focused on stakeholder communication as one of the variables of interest.

From July 2007 to January 2009, this study observed

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that in the IT industry of Islamabad – Rawalpindi, Pakistan, heterogeneous IT projects suffered due to problems like scope creep, cost overrun, schedule delays and customers' dissatisfaction due to the poor quality of managing stakeholder communication and their associated risks. The study selected 24 large software houses including Telecom organizations to identify heterogeneous IT projects with large scope, schedule and budget demanding a challenging and sensitive care in practice of project management knowledge areas. The study realized it is the stakeholder communication through which scope, time, cost and quality standards and probable risks for IT projects are learnt and documented. The study discovered that the project managers along with certain senior team members, mainly including system or business analysts and top management, interact with the clients to learn and define the three primary constraints for the IT projects. This entire exercise revolves around stakeholder communication. Once the primary determinants of any project are interpreted, they are communicated with the project team as much as applicable, based on the role of every team member. The overall supervisor happens to be the project manager who is responsible for the entire management of communication since its beginning to end.

The study identified two different categories of different IT projects. The first category is the IT projects that were reported to have suffered from problems like scope creep, schedule and cost overrun and customers' dissatisfaction. The second category is the IT projects that remained immune from the problems mentioned. The study identified and selected a total of 70 IT projects of both categories. The study set exploring and learning how the quality of stakeholder communication for IT projects affects the project outcome in terms of accomplishing the defined scope within the allocated budget and time ensuring customers' satisfaction as its objective. The study clarifies that it shall entertain the aspects of stakeholder communication relevant to outcome of the selected sample of the IT projects because stakeholder communication is a broad concept that affects different areas like time, scope, stakeholder risk etc but such details are not in scope of the study.

The study targets identifying the precedence of the stakeholder communication among all the aforementioned nine knowledge areas as rendering it merely a secondary support function in the literature does not match with its importance given to it in the real industrial practices. Further, the study intends to discover if the literature supports project managers with a structured framework for stakeholder communication that happens applicable in various situations easily.

Research theory and model

Stakeholder communication encompasses defining the scope of the project, set the requirements related to

scheduling and costing and conducting routine meetings with the team as well as with the clients. Therefore, even a minor mistake in communication planning can lead the project to chaos. Structured framework for communication helps track and distribute information throughout the project life cycle (Desouza and Amuza, 2003). This study perceives that stakeholder communication management is the function that drives the entire project throughout its life cycle. Stakeholder communication drives all other functions and knowledge areas from initiation of a project until its close out. Communication with clients enables the manager to learn project scope, time and cost requirements while intra-team communication enables the project manager to address the project's performance. This study interprets that the quality and effectiveness of communication is the basic prerequisite that makes or breaks the project.

Stakeholder communication, that is the key to success or failure of a project, is a full-fledged knowledge area essential for Project Management (PMI 2009; Schwalbe, 2010). A web source of knowledge revealed that 'project management is central to businesses today', (2005). It contributes that project management remains effective only when there is an effective communication for team management. Flow of correct and timely information, in a well structured manner makes the project team efficient and the processes start to produce in time that affects the project's outcome positively. Establishing a reporting hierarchy between the team members of any project is recommended as an essential HR practice. Where stakeholder communication management is necessary for the beginning and progress of any project, it simultaneously addresses relations and motivation of the project team. Therefore, effectiveness in stakeholder communication management is critical for the project's success. This study perceives that project team members are the primary stakeholders. It is the project manager who is responsible to ensure the flow of adequate, precise and timely information to each member of the team so that at least, the scope and schedule of the project is well interpreted by every member as much as his/her role requires. This study realizes that the communication among stakeholders, including the project team is an ongoing activity that needs to be maintained through the project's life cycle with due care and responsibility. This study interprets that project managers should define and implement a formal communication framework to involve all external and internal stakeholders of the project. The study learnt that literature advises the project managers to update their team members with details like what information will be generated, when, where, by whom and to whom it must reach and at what time. However, this study identifies that the literature does not provide adequate assistance for the project managers on how to develop an effective framework for stakeholder communication easily.

The consciousness of the quality in stakeholder communication is required to ensure that the project ends

achieving success. This study therefore finds it important to explicitly understand what project success is. Success of a project is not limited to a single connotation. Usually, IT professionals consider project success achieved when a project gets accomplished within the stipulated time and budget fulfilling the end user's requirements (PMI, 2009).

An online source of knowledge revealed that the organizations adopting a 'formal project management methodology' (2006) have considerable competitive advantage over those which do not follow a formal approach. The mentioned source considers the following attributes as hallmarks of project success:

1. Reduced time-to-market and time-to-profitability, both key factors for any organization, develop products through their projects.
2. Ensure predictable schedules for profit and product delivery.
3. Offer more effective ways to prioritize, allocate and monitor resources.
4. Demonstrate a commitment to excellence to your customers, your employees and other stakeholders.

This study finds the aforementioned guidelines for project management helpful for interpreting what the project success is. These guidelines indicate that project success could be a mix of the magnitude of the profitability and the times estimated for delivery of the products to the customers and return on investment. The study perceives that profitability may not be a primary concern of project managers who are not sponsoring the projects as this aspect is usually the concern of entrepreneurs in the industry while most project managers view the project as a technical assignment for themselves. However, this study acknowledges meeting timelines should be a primary concern for project managers to avoid cost overrun. This study identifies timing and profitability as two parameters for measuring the project success out of which timing happens to be a major responsibility of the project managers in most of the cases and further a factor that could affect profitability. Ensuring the conformance and compliance of a predetermined timeline is hence important that requires effective communication down the line throughout the project life cycle.

Aaron et al. (2001) declare project success achievable by declaring project management a strategic activity, but complex. Traditionally, a project is perceived successful when it meets time, budget, and performance goals. However project success is not just meeting time and budget. The objective of their study was to develop a multidimensional framework for assessing project success, showing how different dimensions mean different things to different stakeholders at different times for different projects. Given the complexity of this question, a combination of qualitative and quantitative methods and two sets of data were used. Their analysis identified four major, distinct success dimensions for operationalizing it

that were: (1) project efficiency, (2) impact on the customer, (3) direct business and organizational success, and (4) preparing for the future. The method of Aaron et al. (2001) seems more customer-focused and futuristic to this study. It is rational as it targets reviewing what the project has yielded consequently. All the four dimensions contributed by the Aaron et al. (2001) demand effective communication with all the stakeholders.

Standing et al. (2006) recommend measuring project success in terms of fulfillment of requirements, confinement to the allocated budget and time, customer satisfaction and any other applicable parameter that the situation demands. Standing et al. (2006) acknowledge that stakeholder communication is one of the parameters that help project managers in leading the project to success. However, this study realizes that despite adequate acknowledgement of the significance of communication, the literature does not help the project managers with a structured framework for stakeholder communication that acts as a universal tool in helping project managers manage stakeholders' communication effectively.

Based on the interpretations from the literature and observations of the real IT project management in the industries, the study set the framework comprising two variables. Stakeholder communication is taken as an independent variable keeping the project result as the dependent variable.

The study selected the definition recommended by Pitt et al. (2000) for interpreting testing its independent variable stakeholder communication. The major dimensions include a well structured format of communication and its frequency during the project life cycle. The study further imitated the recommendations of Schwalbe (2010) to further elaborate the same concept by focusing on the quality and quantity of the information that stakeholder communication targets, produces and achieves for any project.

The study adopted the definition of Standing et al. (2006) for interpreting project success. It entertains the fulfillment of the requirements defined in project scope, accomplishment of project within budget and stipulated timelines, customers' satisfactions and any other advantages to the project organization provided in the given situation. Figure 1 presents the research model of the study in detail.

Hypotheses

H₁: The better the quality of management of stakeholder communication is, the greater the prospects of project success would be.

H₂: Stakeholder communication in real practice of project management is not a function secondary in importance.

METHODOLOGY

This is a cross sectional study that was conducted in the IT industry

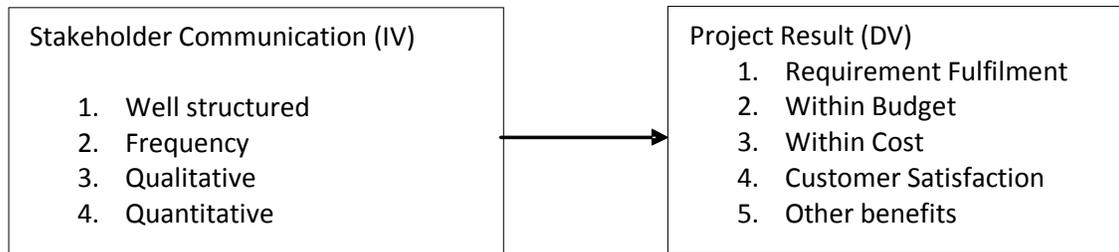


Figure 1. Research Model

of Islamabad and Rawalpindi, Pakistan during the period from July 2007 to April 2009. The study selected 24 large software houses including telecom organizations. It selected the stratified sampling technique to identify and select a sample of 70 heterogeneous IT projects that have been accomplished during the time frame mentioned. The IT projects were mainly dealing with large databases, ERP solutions, telecom software support and development and certain other types like online web portals, etc. The study's selection criteria for the IT project was to ensure that the project team size was at least 5 members or above and its scope was large enough to demand at least 1.5 years for its accomplishment.

The study adopted a pre-tested, reliable instrument adopting questions from the studies of Pitt et al. (2000) and Standing et al. (2006) for collecting, coding and measuring the data relevant to stakeholder communication and its impact on the project result. The reliability and validity of the instrument was high. Table 4 presents the reliability measure of the instrument used by this study that has been tested using SPSS 15.0.

For data analysis the study employed SPSS 15.0 for conducting the analysis of frequency distributions of the dependent variable project result as given in Table 1. The study tested the anticipated correlation between stakeholder communication and project result through Pearson's correlation test whose results are discussed in the next section and elaborated in Table 2. The study also applied linear regression between stakeholder communication and project result to learn and analyze the impact and significance of stakeholder communication for projects results. Its details are provided under Table 3.

RESULTS

Table 1 presents the frequency analysis of the dependent variable project result. To formulate and interpret Table 1, this study utilized following codes for different possible values of the dependent variable- Project Result DV:

- a. Project badly failed as 1
- b. Project failed as 2
- c. Satisfactory project completion as 3
- d. Effective project completion as 4
- e. Excellent project completion as 5

The results in Table 1 revealed that of the selected 70 IT projects of different types, 34.3% IT projects suffered due to substandard stakeholder communication while 65.7% remained successful due to good quality stakeholder communication 3.0 is interpreted as the threshold value for at least satisfactory completion of the project. The

lesser the value than 3.0, the closer the project result to failure is. On the other hand, more the value towards 5.0, better the accomplishment of project. These figures indicate that about 46 projects remained successful while 24 suffered in the selected sample due to quality of stakeholder communication. This finding is evidence that stakeholder communication impacts the project result significantly. This study interprets that considering stakeholder communication secondary is not rational in real practice as compromise on quality of stakeholder communication led 28.6% IT projects to suffer from scope creep, schedule and cost overrun and customer dissatisfaction.

Table 2 indicates that stakeholder communication and project result are highly correlated (Pearson value = 0.718 and $P < 0.000$ in Table 4). The study set H_1 as better the Stakeholder communication, greater the prospects for project success. As Pearson correlation between the two variables under discussion is very high, it indicates that project result highly depends on better quality of stakeholder communication. Thus the study substantiates the mentioned H_1 . The results in Table 3 further indicate that the significance of stakeholder communication for project success should not be considered secondary.

Next, the study applied linear regression between stakeholder communication and project result to further validate and confirm its findings. This study acknowledges that its selection of variables is limited to testing the impact of the independent variable that is, stakeholder communication on the dependent variable that is, project result through linear regression. It is a fact that a project requires various factors to be contributing positively for its success. However, the mentioned limitation of this study is phenomenal as simultaneously entertaining all the relevant variables that affect project result is not pragmatic. The study therefore focused on the selected independent variable under assumption that the confounders and/or intervening variables necessary for project outcome were maintained up to the mark for the selected sample. However, confounders were out of the scope of this study.

Table 3 is the result of running the regression. The results indicate that stakeholder communication as an independent variable is a significant determinant of the

Table 1. Frequency distribution project result (dependent variable).

Value between 1 to 5	Frequency	Percent
Project badly failed		
1.33	1	1.4
1.50	1	1.4
1.67	4	5.7
1.83	2	2.9
Project failed		
	5	7.1
2.17	2	2.9
2.50	6	8.6
2.83	3	4.3
Satisfactory project completion		
	2	2.9
3.17	3	4.3
3.33	1	1.4
3.50	1	1.4
3.67	4	5.7
3.83	2	2.9
Effective project completion		
	10	14.3
4.17	12	17.1
4.33	3	4.3
4.67	3	4.3
4.83	1	1.4
Excellent project completion		
	4	5.7
Total	70	100.0

Table 2. Pearson's coefficient of correlations.

Variable		Stakeholder communication (IV)	Project result (DV)
Stakeholder communication (IV)	Pearson correlation	1	0.718**
	Sig. (2-tailed)	-	0.000
	N	70	70
Project result (DV)	Pearson correlation	0.718**	1
	Sig. (2-tailed)	0.000	-
	N	70	70

** Correlation is significant at the 0.01 level (2-tailed).

Table 3. Result of regression between stakeholder communication and project success coefficient, standard error in parenthesis, t-value in brackets and P-value in italic.

Constant	Stakeholder communication (IV)	R ²	F
-0.543 (0.598)	0.242 (0.183)	0.812	19.947
[-0.909]	[1.326]		
<i>0.376</i>	<i>0.202</i>		<i>0.000</i>

Table 4. Reliability of the instrument.

Number of cases	Number of organizations	Value of alpha
70	24	0.9539

results of IT projects ($P < 0.05$, $F = 19.947$, $R^2 > 0.7$ and Standard error < 1.0). Table 3 indicates that individual β coefficients for the independent variable remain positive. It is evident that stakeholder communication plays as a significant factor for the project result of IT projects as it is positively correlated with it. In Table 3 the respective t value depicts the relative importance of the independent variable for project result. Stakeholder communication possesses high importance for the project result ($t > 1.0$). Table 3 further confirms that the regression between stakeholder communication and project result remained highly significant within the selected sample ($P = 0.000$ and $R^2 > 0.7$). This regression result is interpreted under assumption that the essential knowledge areas and prerequisites for the projects were kept intact. Table 3 further clarifies that stakeholder communication singularly shall not be an effective factor for project result if other determinants are not kept intact ($P = 0.202$) (Sekeran, 2000; Cooper and Schindler, 2003). These findings enable this study to substantiate its H_2 which states stakeholder communication in real practice of project management is not a secondary function in importance.

In acknowledgement of the significance of stakeholder communication, Schwalbe (2010) and 'Formal project management methodology gives considerable competitive advantage', (2006) stressed structuring stakeholder communication through well designed documentation provided it does not increase extra paper work. Schwalbe (2010) advises that project managers should employ well designed forms and documentations for project communication management. The study interpreted that within three forms/templates, a project manager will fulfil the minimum documentation requirement for IT projects.

This study, therefore, realized that three templates should be designed and contributed for helping project managers in structuring their stakeholder communication activities.

Conclusion

Based on the aforementioned findings, the study interprets that both its hypotheses H_1 and H_2 are rational and hence it substantiates them. The study infers that stakeholder communication is one of the significant determinants of project success which should not be considered secondary in routine project management practices. The study acknowledges that all the rest of the knowledge areas and prerequisites for project success should also be maintained simultaneously and only then

the good quality in stakeholder communication will help. For example, if good quality human resources are not hired to form the project team, good quality in stakeholder communication singly will not be helpful. Similarly, all other knowledge areas are important. The study concludes that the significance of stakeholder communication is not secondary and hence it should not be declared secondary or a support function for project management. As per the findings of this study, the stakeholder communication is one of the key factors for defining the scope, time, cost and quality standards for an IT project effectively. The study thus recommends considering stakeholder communication as one of the primary tools for leading the management of primary functions of the project that are scope, time and cost.

RECOMMENDATIONS

This study observed and interpreted that the stakeholder communication for projects is exercised through inter-team meetings/reporting and stakeholders meetings. Providing no schedule for inter-team communication (meeting/reporting) to the team members with a well-defined format for any weekly or monthly reports cannot guarantee effective inter-team communication that a project requires. Further, the study learnt that the project manager interprets project scope, time and cost at the initiation phase of a project through regular, detailed and useful meetings with the clients, end users, project's sponsors and top management of the organization undertaking projects. The know-how of compatible Industrial norms and standards also helps project managers in understanding the scope, time and cost requirements of a project effectively. The study, therefore, recommends that a project manager must consider management of stakeholder communication as one of the primary tools for manipulating the project's scope, time, cost and other knowledge areas well.

As this study has identified stakeholder communication as one of the key factors to manage all the other eight knowledge areas and lead HR throughout the project life cycle, therefore it contributes the following guidelines for the project managers in this context:

1. Projects managers must provide inter-team communication as well as a stakeholder communication schedule during the Project Planning Phase. For this purpose, they may utilize the Template A provided in Appendix 1 or may design similar format as applicable for their project

or organization. Template A is designed to ensure flow of information among stakeholders within the team in a structured manner ensuring adequate quality and quantity of the information. Project manager needs to ensure that it remains the adopted conforming project schedule. It is suggested that inter-team communication should be scheduled as weekly or monthly or at least near (two weeks to) milestones. For different projects the required frequency of inter-team communication can certainly vary. Stakeholder communication could occur less frequently. The beginning of every phase or the end of every phase is the most appropriate time periods for scheduling meetings among all the stakeholders. The study recommends using Template A for the purpose and keeping it public at the project planning phase so that all stakeholders remain synchronized. Once a meeting is to be conducted, its agenda must have been defined in advance. Every stakeholder meeting should ideally be minuted for reviewing progress in future.

2. Inter-team communication can occur both through meetings as well as reporting to seniors through emails, etc. A balance of both the approaches should be used. For example, meetings near milestones with reporting at the end of every month or week could be adequate for a project needing six months time with 4 to 5 milestones. However, project managers must decide about the frequency of inter-team communication considering the project's length, complexity and team's strengths. As too many meetings remain counterproductive, frequency of inter-team meetings must be appropriately set.

3. For meetings, managers should select the venue and timings that remain suitable to all the team members. Project manager should entertain gender, cultural and regional limitations in this regard and must remain flexible as applicable. Like females better not be forced to attend late night inter-team meetings in the culture of Pakistan.

4. For reporting (weekly, monthly or other), reports must be designed. Manual reports can be used but software reports had better be preferred. This study contributes Template B and C provided in Appendix 2 that the project managers may adopt for Report from the Subordinate and Information from the Super-Ordinate respectively. The study contributes these templates so as to help project managers structuring the stakeholder communication. Even if not adopted, at least these templates shall certainly guide the project managers to structure the stakeholder communication adequately by designing similar formats for reports. The study is confident that the use of template B and C will ensure simple paper work and proper documentation of activities performed. This shall further help in monitoring performance.

5. Project manager must use an appreciating and reforming approach while communicating with his/her team both in oral and written modes. Appreciating the work of team members boosts motivation and avoids disruptive stress. Overall, a project manager must be such a facilitator for his/her team that every team member finds it

appealing to approach the project manager for all work related as well as personal issues. Simultaneously, the project manager should ensure, in a polite and friendly manner, that there exists an acceptable level of stress on each member which keeps him/her motivated enough to stay committed with the assigned tasks.

The study has contributed the sample templates to ensure a structured documentation and format for the project information related to all its necessary affairs. The study finds testing the recommended templates an opportunity for further research.

FUTURE RESEARCH

The template that this study has contributed triggers the opportunities to test them through further research in the fields of project management, stakeholder risks etc. The findings of this study further enable researchers in the relevant field to explore more about the significance and importance of the stakeholder communication for managing project time, scope, cost, risk and quality. The study perceives that testing its recommendations by applying in the real project management exercises shall enable practitioners conduct and contribute further improvements in managing the triplet constraints, quality and risk for projects.

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APPENDICES

Appendix 1

Template A

Schedule for stakeholder communication

Project title: _____

Guidelines:

Fill as directed during the project's planning phase. Add as many rows as needed.

Event/Occasion	Mode of communication	Agenda	Participants	Venue	Duration
Like	1. Meeting	Like	1. All Stakeholders	Like	Like 2:00 pm to 3:00 pm on 30/06/2006 etc.
One week before first Mile Stone	2. Teleconferencing 3. Video Conferencing 4. Emailing 5. Chatting 6. Informal telephonic talk 7. Other	Finalizing Project scope, Time and cost	2. All team members 3. Selected Members: _____ (Mention names)	Sponsor's Environment or In Office, etc.	

Appendix 2

Template B

Report from subordinate

Project title: _____

From: _____

To: _____

Date: _____

Time: _____

Guidelines:

Direct all team members to fill this template essentially either weekly or monthly or as best suits your project. However, remember that too much documentation may decelerate progress. Add as many rows as needed.

Task	Progress	Issues (If any)	Suggested remedies/Required resources
Like	Like	Like	Like
Analysis under execution (Task number 14)	50% accomplished	End user is non-technical Or Nil	Let us use prototyping for analysis Or Nil
....

Template C

Information/Inquiry from Super-ordinate

Project title: _____

From: _____

To: _____

Date: _____

Time: _____

Guidelines:

Direct all super-ordinates in your team to use this template when needed. However, remember that too much documentation may decelerate progress. Add as many rows as needed.

Issue/Inquiry/Information	Instructions or suggested actions
Like	Like
Client site validation check is missing in file X	Code client site validation check using java script for all fields in file X no later than 23/07/2006
....

Full Length Research Paper

Internet related network coordinating tools and their uses amongst different classifications of business employees

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Computer networks play a significant role in business management nowadays. This is especially true for Taiwanese business, which has made a considerable contribution to the global information products. Most enterprises in Taiwan rely heavily on various networking tools to coordinate the business procedures. This research adopted the viewpoints of the technology acceptance model and information richness theory: The users would experience usefulness and ease of use during the interaction process because of the abundant networking information. Due to their high network-utilization tendency, Taiwanese business employees were selected as the study sample. The purpose of this study was to categorize the types of users with different job content using networking tools as coordination media. The empirical study found four types of users: the followers and imitators, the self-confident, the technophiles, and the mediocre and conservatives. Moreover, significant differences were found across the four groups in terms of their interactions with, and cognition of, networking tools. Last, the study provided some suggestions for managerial practices according to the characteristics of these four types of users.

Key words: Network, interaction, cognition, Taiwanese business.

INTRODUCTION

According to information richness theory (Daft and Lengel, 1984), to achieve better communication performance, one should use rich media content for highly complicated tasks but poorer media content for less complicated tasks. As a result, corporations would intensely apply networking information to all types of interaction related to business procedures (Hashim et al., 2010). Coordination media, on the other hand, relies heavily on networking tools. Information exchange is made possible through various types of network connections; for example, web page communication, instant messengers, video conferencing, fax, voice messengers, text, short multi-media messages, and so on. Forman and Zahorjan (1994) indicate those networking access devices, especially the portable ones, are restricted by the immobility of the hardware, otherwise, the dependency on network in everyday lives and works would be much more significant. Hoffman and Novak (1996) consider interactions between humans and machines as much

more significant than those between machines only or humans only (Alam, 2009). This is because carrying out effective dual directional comment exchanges or communication coordination is easier for a human-machine interaction. To share a collaborative performance for cross-departmental coordination, Eng (2006) notes it is necessary to establish consistent rules to promote a sense of trust between both parties. Ching (1996) considers using the information network to facilitate communication and coordination can overcome some restrictions of the physical environment. Moreover, with the mobility offered by a wireless network, the information network now offers an instantaneous decision-making coordination function (Huang and Liu, 2004). Neil (1997) and Prakash (1996) also note, besides accelerating the communication speed compared to conventional telephones, computer networks also provide more interactions than conventional face-to-face of communication. Especially under circumstances where geographic or

time-zone restrictions exist, computer network systems can reduce the cost of communication, bettering conventional communication approaches (Hagel and Singer, 1999). The results from Shih et al. (2005) also suggest electronic mail (e-mail) is the most commonly chosen coordination tool by most business corporations. Computer network has modified the content of jobs as well as the approaches from every dimension (DeSanctis and Jackson, 1994). Further, a new type of job has been formed, which mainly relies on computer network interactions. As computer networks expand, the convenience and instantaneity offered by the network have been well utilized by corporations in various business tasks; whether the task is between the individuals, the departments, or the companies. A high level of network interaction requires stable platform performance. With enhanced functions of various mobile computing devices and booming technology development in assorted wireless networks, computer network services are now available to the users at any location and time (Pan and Lee, 2003; Wahab, 2011). For corporations, computer networks have solved some problems related to special as well as time barriers. In a sense, whether or not the networking tools that offer highly efficient interactions and highly effective cognition are well utilized by a corporation significantly affects the work performance and satisfaction of the corporation. According to the technology acceptance model from Davis (1989), rich networking information allows the users to experience usefulness and ease of use during the interaction. Therefore, how to enhance the efficacy of the corporation-network interaction, adopt the best managerial approach, and adapt and adjust to the networking tools dynamically to improve a corporation's competitiveness are topics every business has to understand. Various studies have examined the impacts of information technology on corporate management (Situ et al., 1994; Hodson and Englander, 1999; Shih et al., 2005), but there are few studies analyzing circumstances where networking tools are used as coordination media by users of different job content. As a result, Taiwanese business was chosen as the target of the study to examine the interaction behaviors and cognitive attitudes of users relying on networking tools as coordination media. Moreover, suggestions for managerial practices were provided at the end of the study.

Networking tools as coordination media

Departmental collaboration is an important aspect of corporate management. A corporation in the developmental phase usually has a significant need for coordination efficacy, and as a result, the dependency on work specialization is often exceedingly high (Alam et al., 2010). Nonetheless, it is no longer easy for the conventional coordination approach to fit into this scenario. Fan (1999) found significant cognitive differences between the

marketing and the manufacturing departments on issues related to distribution and production quantities. Due to cognitive discrepancies between two departments, collisions frequently occur during the interaction process. To solve this case, a coordination mechanism is definitely required to reduce their conflicts and improve the performance of the corporation. For corporations, establishing a network coordination activity to improve the satisfaction level of the business interaction is crucial for successful business performance. In Hsieh and Hsu (2004), the authors analyzed the organization and the system of the network environment and found network information interaction has already become an indispensable part of corporate communication. Davidow and Malone (1992) also considered treating information as the focus has been the trend for organizational renovation. Fundamentally, to stand out from a competitive market, different corporate entities have to rely on a network platform to collaborate with one another, connect and integrate the internal as well as the external corporate information, share the value chain, and realize complement of competitive resources (Alam et al., 2010). Chen et al. (2006) suggested a corporation could enhance the communication and interactions among its collaborators by fully utilizing the network system. Applegate and Coagan (1995) and Applegate (1995) explained using network technology could add some value to a cross-organizational business procedure and promote the development of business transformation (Tapscott, 1997; Grenier and Metes, 1995; Leifer, 1988). Moreover, Tang et al. (2006) indicated various influences from network technology, such as overcoming those time and space restrictions, providing channels for communication and coordination, and improving information quality. Seemingly, network technology acts like a base that facilitates the realization of electronicized corporation (Tang and Chen, 2002). Nonetheless, in some cases where the organizational structure is not clearly defined, there is frequently a blurry interface among the departments as well as a multi-dimensional cross-organizational job. As a result, more connections to networking tools are required for the external corporate information to be correctly and rapidly delivered to the intended location. There is a flourishing development of the network environment. Corporations should make good use of the networking tools on communication and coordination because it profoundly affects job performance and satisfaction (Cockburn and Wilson, 1996).

Technology acceptance model

According to the technology acceptance model (Davis, 1989), when users experience usefulness and ease of use from a new technology, they will be encouraged to keep on trying or to accept this new technology. The term "networking tools" in this study refers to the networking

software and hardware used to carry out communications without the communicators being face-to-face, such as casually meeting in business (Chuang et al., 2011). When there is a continuous innovation in networking tools and the users recognize the beneficial features, that is, usefulness and ease of use, then those networking tools can accelerate and facilitate business conduction as well as enhance the performance related to coordination. Some basic attributes of networking tools include the networking environment, the system platform, wireless or not, communication software, networking speed, and interface-related factors. These attributes have a crucial impact on determining whether the users would adopt networking tools as coordination media. The telephone and the Internet are both major communication tools, which are now converging with the advancement of communication technology. These tools' service attributes are very similar, such as the price, added value services, and communication quality (Iimi, 2005; Kim et al., 2004). There are two major types of network platforms available on the market: the Internet and the telecommunication networks (Chuang et al., 2011). The term Internet is mainly used for the communication process that relies on a computer network platform. The term telecommunication network, on the other hand, refers to mobile phone services or mobile personal digital assistants (PDA), which provide web browsing and phone services. There are also other factors related to the type of software and the application programs provided by hardware development dealers, such as speed, content, capacity, and institution, which may affect a corporation in selecting the networking tools.

Information richness theory

In addition, the job content type of the users is another key factor influencing the selection of networking tools. According to information richness theory, rich information content can provide practical aids to areas such as communication, coordination, collaboration, and information sharing. This is especially true for those jobs with a highly complicated content. In other words, when a user's working environment is highly complicated, then the user would require support from content offering more information. Alternatively, if the working environment is less complicated, then less information should be given to improve work performance. Many discussions on job content in the past literature are based on Job Content Questionnaire ver1.5 (JCQ) (Hurrell et al., 1998) to assess the psychological working environment. The questionnaire has mostly been used to evaluate the quality of job content or the level of physical or psychological stress by assuming a high level of psychological demand and a relatively lower level of stress at work (Karasek and Theorell, 1990; Schnall et al., 1994; Fenster et al., 1995; Cheng et al., 2000; Jiang and Ma,

2003). Nevertheless, the questionnaire is also an effective assessment tool for distinguishing various collaborative phenomena among the employees. For example, the results from Chen et al. (2003) suggest five main categories: job control, psychological demands, supervisor support, coworker support, and job satisfaction. As a result, this research presents the following hypothesis:

H₁: Depending on the type of the job content, there are significant differences when using networking tools as coordination media.

Interaction by networking tools

Past literature on corporate interaction mostly focused on departmental interactions (Fang, 1999; Crittenden, 1992; Ruekert and Walker, 1987). There are also reports on personal interactions. Meng (2002) examined network interactions from a communication perspective and found network interactions play a significant role in interpersonal communications, individual development, and social progress. Chen (2002) also indicated that Internet is the new spiritual communication approach that differs from the conventional mass media. Specifically, it differs from conventional face-to-face interaction approach which is influenced by social authority. Interaction behavior originates from the user's inner motivation. Interaction behavior via the Internet is more natural and removes the hierarchy of authority. Moreover, compared to the mass media, Internet interaction is more localized and globalized. Generally, a highly interactive network requires a steady power from the information platform. Using enhanced functions of assorted mobile computing devices and a flourishing wireless Internet technology, Internet services are available at any time and at any location. A rich information exchange can be carried out by connections with a multi-dimensional computer network. This is the reason corporations have to work on maintaining a stable network communication platform to achieve a good operation. The network acts like a vector that the users can freely interact with at relatively little cost and a high level of privacy (Li, 2005). Further, separating binary network characteristics into two dimensions—Internet platform and Internet information—Tang et al. (2006) examined managerial activity design for organizations based on these two dimensions using the interaction achieved through the Internet platform as the study variable. They point out organization members participating in coordination activities should frequently and extensively use the Internet platform connection system. For both sides, because of the goal of the organization, they should keep in touch with each other using the Internet platform for assorted value activities. Chang (2002) indicates several uncontrollable confounding factors: a limited number of computers with Internet access,

time restriction, and a reshuffle of the Internet management personnel. For Internet users in general, their level of satisfaction significantly depends on the following factors related to the Internet information: richness, instantaneous, interactions, and convenience. In other words, a higher interaction level is determined by a greater amount of exchanges in forms of message posting frequency, e-mail quantity, click-through rate of the web page, and computer fax exchanges. It is also true when offering different types of Internet connections, a greater number of information exchange interface also suggests a higher level of interaction. As a result, networking tool interaction behavior is defined as: Exchanging messages among members of an organization, people rely on networking tools such as web page posting, e-mails, computer fax, and short messages to complete the task. For problems encountered during the message exchange process, relevant data were collected and integrated for making decisions such as "cannot be adopted", "references only", "taken into consideration", "can be frequently used", or "definitely adopted". As a result, this study proposes the following hypothesis:

H₂: Depending on the types of users taking networking tools as coordination media, there are significant differences in their interaction behaviors.

Cognition of networking tools

Cognition is an integrated habitual characteristic expressed by an individual in forms of explicit behaviors following some mental process such as perception, thinking, memory, and problem-solving when the individual has experienced a specific context. It is an individual-specific and long-lasting memory that is stable and consistent. Rao (1994) considers the basic human cognition process is a sensory effect generated by external stimulation. The stimulated sensory organ then went through selective attention and recognition to generate perception and finally move to memory. When an individual receives a message, depending on the environment, the mood, and social as well as physiological variations, various types of cognition can be generated (Dunn and Dunn, 1978). Lin (1988) considers cognition an abstract concept because during the interaction process between two individuals, there are inconsistent viewpoints between the two individual regarding people, events, and matters of the external world. In other words, cognition can be further considered an expression of an individual's characteristics (Hsu, 2000). There are many uncertainties and cognitive discrepancies in the Internet environment. Using personal interview surveys and the Q-sort method, Tang (2008) chose college students as the example to examine cognition types of users who took network communication tools as coordination media. The author found the interviewed college students' cognition on Internet coordinating tools could be categorized

into five types: emotional dependent, trend followers, practical application, economical orientation, and special functions. To improve and enhance the quality and satisfaction level of the communication tools, the business should design network communication tools according to the cognition types of the Internet coordination tools. There are many studies related to cognition (Tai, 1994; Zhou and Yang, 2003). For networking tools, the effects of cognition on the development of the coordination attitude and on the post-event behaviors of an individual can provide some valuable information. In fact, discrepancy exists among researchers regarding the concept and analytical levels of cognition types. Some suggest different habitual characteristics are generated by psychological processes, that is, perception, thinking, memory, and problem solving, that an individual experiences in a specific context and are expressed in forms of explicit behaviors. Others suggest, as an individual is stimulated externally, this stimulation, depending on the individual's habits, awareness, and preferences, is reflected through the explicit behaviors. For the process of Internet use, the main purpose is information delivery. Through the process of information exchange, different opinions are generated depending on the preferences, habits, context at that specific moment, and various combinations of these factors of the individual who is at the receiving end of this information exchange. In other words, some feelings or impressions generated from the consumption of the information content can indirectly cause different viewpoints on the Internet through the decision-making process during consumption. As a result, networking tool cognitive attitude was defined as: For organization members, they acquire official as well as unofficial messages through interactions. Therefore, during the business coordination process, different reactions and attitudes are generated toward Internet information, such as "communication convenience", "uniqueness", "job requirements", "trend following", and "peer influences", depending on the user capacity, awareness, preferences, problem-solving skills and various mental processes. As a result, this study proposes the following hypothesis:

H₃: Depending on the type of the user taking networking tools as coordination media, there are significant differences in their cognitive attitudes.

METHODOLOGY

The initial draft of the survey questionnaire was designed based on information acquired from past research. The content was then revised by instructors with PhDs. in areas related to management. The questionnaire was pre-tested twice on 12 graduate students at the school and 7 full-time instructors, respectively, and their alpha reliability were both greater than 0.8. There were three sections to the questionnaire. Items in the first section were for measuring the attributes, feelings, and attitudes from using networking tools. The included attributes were the network connection, operating system, connection framework, communication software, memory capacity,

and network interface. As for the attitudes, the focuses were on the job content of the communication using networking tools, the experiences of “communication convenience”, “uniqueness”, “job requirements”, “trend following”, and “peer influences”. In addition, various decision-making attitudes derived from network information such as “cannot be adopted”, “references only”, “taken into consideration”, “can be frequently used”, or “definitely adopted” were included. The second section focused on measuring the job content type of the interviewees (Hurrell et al., 1998; Cheng et al., 2003). Question items were adopted from JCQ. The reason for choosing JCQ for this part of the questionnaire was many studies on the psychological aspect of the working environment were JCQ-based. The third section of the questionnaire was for collecting the interviewees’ basic personal information (that is, demographic variables) including gender, age, education, years of work experience, department, job title, and rank. In the questionnaire, the ranks of interviewees in their company were classified into four levels: high-level managers, medium-level managers, basic-level managers, and non-managerial positions. The study also proposes the following hypothesis:

H₄: Depending on the type of users taking networking tools as coordination media, there are significant differences in the demographic variables.

According to Babbie (1998), stratified random sampling is a more systematic approach than random sampling, and also, this approach can reduce errors during the sampling procedure. The study samples were companies registered in the Travel Agent Association of R.O.C., Taiwan, and they were randomly selected according to the stratified ratio. There were 2872 members in Taiwan at July 31, 2008, and they were randomly sampled according to the stratified ratio. All the information and questionnaires from the study samples were collected by mail. A total of 589 questionnaires were mailed the first time, but the return rate after four weeks and after 1 month was poor. Questionnaire follow-up was conducted through telephone calls, and questionnaires were mailed again to samples that had not participated in the first round. Questionnaires were mailed three times. At the end, 321 questionnaires were returned with a return rate of 27.25%. There were 98 invalid questionnaires, such as having exactly the same answer for all the questions, having answers filled in a zigzag style, having missing answers, or having extra answers. These were eliminated by the questionnaire coding personnel. In the end, there were 223 valid questionnaires with a return rate of 18.93%. Basic information were collected by the survey questionnaire approach and analyzed by SPSS statistic software for (1) descriptive statistics, (2) factor analysis, (3) cluster analysis, (4) Chi-Square test, (5) one-way analysis of variance (one-way ANOVA), and (6) correlation analysis.

RESULTS AND DISCUSSION

Job content type analysis

The result from the Barlett’s test of sphericity suggested the existence of common factors in the correlation matrix of the population because the approximation of Chi-Square was 2487.109 ($P = 0.000$). The value of KMO (Kaiser-Meyer-Olkin) was 0.714, indicating the random sampling effect of this study was significant. It was also suggested the study results could be used for factor analysis because a KMO value greater than 0.6 indicates many common factors among the variables. For factor

analysis, Kaiser (1974) noted a KMO greater than 0.7 has a medium number of factors and is acceptable, whereas a KMO greater than 0.9 is excellent. Step 2 reduced the number of variables to extract a fewer numbers of factors to make the analysis easier. Maximum likelihood is the best. It can also reduce the variance within the factor to the minimum level and therefore, obtain the factor construction for the job content type. Varimax Orthogonal Rotation was conducted to obtain the factor loading matrix to facilitate explaining the factors. According to Joseph et al. (1987), an absolute value of factor loading greater than 0.3 is considered significant; an absolute value greater than 0.4 is considered more significant; and an absolute value greater than 0.5 is considered very significant. Zaltaman and Burger (1975) also suggested for a suitable method—sampling by extracting the Eigenvalue greater than 1, the loading of each variable is greater than 0.3, and the accumulated explained variance is greater than 40%. Using the principle axis factoring method and the Varimax Orthogonal Rotation to conduct the analysis, the factor loading after the rotation has to be greater than 0.3. For the selection criteria, researchers can also establish their own criteria according to the real condition or their experiences. Integrating the comments from the abovementioned researchers, this study selected the variables where the absolute value of factor loading was greater than 0.35 as the reference for factor labeling. From the rotation analysis, six factors were found after the rotation using eigenvalues greater than 1. Because there were too many factors, the eigenvalues obtained after the rotation were listed in order: 3.080, 2.467, 2.213, 2.137, 2.012, and 1.809. Only six eigenvalues after the rotation were greater than 1 because the seventh eigenvalue was 0.714. In addition, the factor’s cumulated explained variance was 50.812%. As a result, no question item was eliminated in the later analysis. Last, according to Guelford (1965) and Nunnally (1978), a Cronbach’s α greater than 0.7 suggests good reliability; a Cronbach’s between 0.7 and 0.35 suggests acceptable reliability; a Cronbach’s alpha less than 0.35 suggests unacceptable reliability. George and Mallery (2003) also provided some evaluation criteria. This research used the abovementioned reliability as the evaluation criteria for measuring the job content type. Moreover, because all the Cronbach’s α of the factors were greater than 0.7, the reliability was acceptable. As a result, from the factor analysis of the job content type scale, this study took eigenvalues greater than 1 and therefore obtained six factors for labeling the job content type. From sorting the eigenvalues, the explained variances, all the question items in the factor analysis, the factor structures, and the factor loadings, this classification was found to be similar to the finding of Cheng et al. (2003). As shown in Table 1, the factors were labeled as autonomous skills (AS), job satisfaction (JS), inner demands (ID), peer support (PS), hierarchical decision-making (HD), and superior

Table 1. The factorial structure distribution for the job content type.

Factor naming	Alpha	Eigenvalue	Explained variance%
autonomous skills (AS)	0.851	3.080	11.4
job satisfaction (JS)	0.803	2.467	9.1
inner demands (ID)	0.721	2.213	8.2
peer support (PS)	0.779	2.137	7.9
hierarchical decision-making (HD)	0.745	2.012	7.5
superior authorization (SA)	0.732	1.809	6.7

authorization (SA). The total variance was 50.812%, suggesting it had reached a significant level and could be used for later analysis.

Cluster analysis

According to the cluster principle, step 1 used the well-known Ward's method from the Hierarchical methods to obtain a suitable number for the cluster utilizing the factors of job content type as the variables. Then in step 2, the K-mean method, a cluster method that is non-phasic, was used for cluster analysis. A most important step for hierarchical method analysis is to determine the cluster number; nonetheless, there are few objective literatures or rules for ensuring the appropriateness of this number. During a common continuous analysis process, group distance is often used as the indicator. That is, when the distance exceeds a certain cut-off point or the distance changes significantly during the process of continuous analysis, then one should stop increasing the cluster number immediately. Another commonly used method is to use the within-group variance as the indicator for cases having many clusters. If reducing the cluster number and carrying out a merge can cause a significant trend of increase of the within-group variance, then the merge should be given up and the previous cluster number should be used as the standard. As for the aspect of the number of each cluster's members, according to Ward's method, the number of members within each single cluster should be more than 20. From the abovementioned, this study adopted the within-group variance as the indicator. The within-group variance for each cluster number was calculated first. The cluster number showed a significant percentage increase when the cluster number was merged from five to four. As a result, this study selected four as the cluster number for Ward's method.

Next, the K-mean method was used for cluster analysis and comparison. The results from SPSS suggested the grouping result from Ward's method slightly differed from that by the K-mean method. Therefore, the grouping result from the K-means method was treated as a grouping variable for the discriminant analysis of the six variables obtained from the Maximum Likelihood method. The purpose was to assess the precision of grouping by

the discriminant function. The higher the precision, the better the grouping results were. From the analysis, the Wilks' Lambda was 0.57, Chi-Square was 122.098, the degree of freedom was 4, and the significant α was 0.000 (< 0.05). This finding suggested good discrimination power. After confirming the cluster number, the following step was to label each cluster, as shown in Table 2:

1. Cluster A: The Followers and imitators (FI): Networking tool users from this cluster emphasized hierarchical decision-making (0.44), followed by autonomous skills (0.42), and peer support (0.32). They put less emphasis on inner demands (-1.35), job satisfaction (-0.48), and superior authorization (-0.26). In other words, users in this cluster did not actively become the first ones to use the networking tools. Rather, they got involved as spectators by observing the user experiences of their colleagues. When they experienced positive feedback, they would approve the tools immediately and fully adopt the tools. As a result, this cluster was referred to as the followers and imitators (FI).

2. Cluster B: The Self-confident (SC): Networking tool users in this cluster put more emphasis on peer support (0.58), followed by inner demands (0.34), and job satisfaction (0.27). What they emphasized less were autonomous skills (-0.25), hierarchical decision-making (-1.38), and superior authorization (-0.09). In other words, users in this cluster possessed more self-awareness at work, and were usually quite confident in terms of self-performance, especially for applying networking tools to their everyday work. They also considered ideas from their colleagues, but they did not approve of overly restrictive managerial strategies. Therefore, this cluster was referred to as self-confident (SC).

3. Cluster C: The Technophiles (TP): Networking tool users in this cluster emphasized job satisfaction (0.67), followed by hierarchical decision-making (0.45), inner demands (0.23), and superior authorization (0.15). They put less emphasis on autonomous skills (-0.37) and peer support (-0.21). In other words, users in this cluster preferred novel technology tools and were quite capable of solving the problems by themselves. Support from peers, however, was limited or treated as a reference only. As a result, this cluster was referred to as the technophiles (TP).

4. Cluster D: The Mediocre and conservatives (MC):

Table 2. ANOVA (analysis of variance) for different clusters.

Job content type↓	Cluster →	FI	SC	TP	MC	ANOVA / Scheffe	
						F	p
1. AS		0.4238 ¹	-0.2532 ³	-0.3704	0.0058 ²	13.912	0.000*
							FI > SC, p=.003 FI > TP, p=.000 MC > TP, p=.046
2. JS		-0.4872 ³	0.2737 ²	0.6656 ¹	-0.5436	42.983	0.000*
							SC > FI, p=.000 TP > FI, p=.000 TP > SC, p=.038 SC > MC, p=.001 TP > MC, p=.000
3. ID		-1.3480	0.3413 ¹	0.2325 ²	-0.5709 ³	8.138	0.000*
							SC > MC, p=.000 TP > MC, p=.001
4. PS		0.3215 ²	0.5761 ¹	-0.2105 ³	-1.0510	32.269	0.000*
							FI > TP, p=.025 FI > MC, p=.000 SC > TP, p=.004 SC > MC, p=.000 TP > MC, p=.000
5. HD		0.4391 ²	-1.3862	0.4543 ¹	-0.6350 ³	106.075	0.000*
							FI > SC, p=.000 FI > MC, p=.000 TP > SC, p=.000 MC > SC, p=.000 TP > MC, p=.000
6. SA		-0.2664	-0.0894 ³	0.1518 ²	0.4732 ¹	7.388	0.000*
							TP > FI, p=.002 MC > FI, p=.004

¹It was the highest average factor score from the cross-sectional comparison; ² It was the second highest average factor score from the cross-sectional comparison; the shaded sections in the table indicated significance from the single factor ANOVA ($p < 0.05$).

FI: Followers and imitators; SC: Self-confident; TP: Technophiles; MC: Mediocre and conservatives); Autonomous skills (AS), job satisfaction (JS), inner demands (ID), peer support (PS), hierarchical decision-making (HD), and superior authorization (SA)

Networking tool users in this cluster emphasized superior authorization (0.47) and autonomous skills (0.01). They put less emphasis on job satisfaction (-0.54), inner demands (-0.57), peer support (-1.05), and hierarchical decision-making (-0.63). In other words, users in this cluster were mostly spectators: they did what others did and they were highly passive. They acted only because the boss had asked them to. They were neither interested in the novel technology nor the networking tools. They had weak motivation. This cluster was therefore referred to as the mediocre and conservatives (MC).

Hypotheses analyses

Hypothesis 1

For the ANOVA, four clusters were treated as independent variables and six factors were treated as dependent variables. With $\alpha = 0.05$, Hypothesis 1 cannot be rejected. In other words, when using networking tools, the interviewees demonstrated significant differences in terms of different types of job content. According to this variation, the post-hoc Sheffe test was conducted.

1) Autonomous skills (AS): For the average factor number in the cluster, the followers and imitators were the highest; the mediocre and conservatives were the second highest; and the self-confident was the third highest. For the significant level, there were significant differences across the clusters. The results from the post-hoc Sheffe test revealed the follower and imitators > the self-confident ($p = 0.03$); the followers and imitators > the technophiles ($p = 0.000$); and the mediocre and conservatives > the technophiles ($p = 0.046$).

2) Job satisfaction (JS): For the average factor number in the cluster, the technophiles were the highest; the self-confident was the second highest, and the followers and imitators were the third highest. For the significant level, there were significant differences across the clusters. The results from the post-hoc Sheffe test revealed the self-confident > the followers and imitators and the technophiles > the followers and imitators ($p = 0.000$); the technophiles > the self-confident ($p = 0.038$); the self-confident > the mediocre and conservatives ($p = 0.001$); and the technophiles > the mediocre and conservatives ($p = 0.000$).

3) Inner demands (ID): For the average factor number in the cluster, the self-confident was the highest, the technophiles were the second highest, and the mediocre and conservatives were the third highest. For the significant level, there were significant differences across the clusters. The results from the post-hoc Sheffe test revealed the self-confident > the mediocre and conservatives ($p = 0.000$) and the technophiles > the mediocre and conservatives ($p = 0.001$).

4) Peer support (PS): For the average factor number in

the cluster, the self-confident was the highest, the followers and imitators were the second highest, and the technophiles were the third highest. For the significant level, there were significant differences across the clusters. The results from the post-hoc Sheffe test revealed the followers and imitators > the technophiles ($p = 0.025$), the followers and imitators > the mediocre and conservatives ($p = 0.000$), the self-confident > the technophiles ($p = 0.004$), the self-confident > the mediocre and conservatives ($p = 0.000$), and the technophiles > the mediocre and conservatives ($p = 0.000$).

5) Hierarchical decision-making (HD): For the average factor number in the cluster, the technophiles were the highest, the followers and imitators were the second highest, and the mediocre and conservatives were the third highest. For the significant level, there were significant differences across the clusters. The results from the post-hoc Sheffe test revealed the followers and imitators > the self-confident, the followers and imitators > the mediocre and conservatives, the technophiles > the self-confident, the mediocre and conservatives > the self-confident, and the technophiles > the mediocre and conservatives (all the above had $p = 0.000$).

6) Superior authorization (SA): For the average factor number in the cluster, the mediocre and conservatives were the highest, the technophiles were the second highest, and the self-confident was the third highest. For the significant level, there were significant differences across the clusters. The results from the post-hoc Sheffe test revealed the technophiles > the followers and imitators ($p = 0.002$) and the mediocre and conservatives > the followers and imitators ($p = 0.004$).

Hypothesis 2

The results from Pearson χ^2 test (significant at $\alpha = 0.05$, $df = 18$, Chi-Square = 29.109, and $p = 0.047 < 0.05$) revealed Hypothesis 2 cannot be rejected. In other words, networking tool users of different clusters demonstrated significantly different interactive behavior. As shown in Table 3, most of the interviewees in the sample considered interactive behavior as "communication conveniences" (132 / 223 = 60%). There were also some interviewees considering interactive behavior as "job requirements". The fewest interviewees considered interaction behavior as "trend followers" (8 / 223 = 3.5%).

Hypothesis 3

The results from Pearson χ^2 test (significant at $\alpha = 0.05$, $df = 18$, Chi-Square = 30.886, and $p = 0.030 < 0.05$) revealed Hypothesis 3 cannot be rejected. In other words, networking tool users of different clusters demonstrated significantly different cognitive attitudes. As shown in Table 3, "can be frequently used" was most commonly

Table 3. Interaction behavior and cognitive attitude (including the number of counts in each cluster).

Variable	FL	SC	TP	MC	
Interaction behavior	Communication convenience	44	24	44	20
	Uniqueness	8	3	3	8
	Job requirements	9	8	15	4
	Trend followers	1	1	3	3
	Peer influences	10	21	3	2
	Other reasons	1	1	3	1
	No experience	0	2	0	0
Cognition attitude	Cannot be adopted	3	3	0	2
	References only	11	4	18	8
	Taken into consideration	21	9	22	9
	Can be frequently used	21	16	26	13
	Definitely adopted	10	8	4	6
	Other reasons	7	0	1	0
No experience	0	1	0	0	

(FI: Followers and imitators; SC: Self-confident; TP: Technophiles; MC: Mediocre and conservatives)

chosen cognitive attitude by the interviewees (76 / 223 = 34%), the next common cognitive attitude was “taken into consideration.” The fewest interviewees chose “cannot be adopted” (8/223 = 4%).

Hypothesis 4

Pearson χ^2 was used to examine differences across the cluster in terms of demographic variables (including gender, age, education, years of work experiences, department, job title and rank). It was found at the $\alpha = 0.05$ significant level, first, there was no significant difference between the genders of the employees using networking tools (df = 3, Chi-Square = 0.359, $p = 0.949 > 0.05$, female = 73, male = 150); second, there was no significant difference across the age groups of the employees using the networking tools (df = 12, Chi-square = 12.176, $p = 0.432 > 0.05$, 27% of the networking users were between 30-49 y.o., indicating the age distribution of the networking users in this study was mostly at younger ages; third, there were significant differences among employees of different education levels in using networking tools (df = 12, Chi-Square = 27.051, $p = 0.008 < 0.05$, most of the networking tool users had a college degree (colleges of technology; 56/223 = 25%), the fewest users had education higher than graduate school (56/223 = 25%)); fourth, there was no significant difference among employees of different years of work experience (df = 15, Chi-Square = 17.468, $p = 0.292 > 0.05$, most of the networking tool users had less than 10 years of work experience, 147/223 = 66%, and the fewest networking users had more than 20 years of work experience, 13/233 = 6%); fifth, there was no significant

differences among employees of different departments using networking tools (df = 21, Chi-Square = 21.300, $p = 0.441 > 0.05$, most of the networking tool users were in sales-related departments, 67/223 = 30%, the next highest was in human resource- and finance-related departments); and last, there was no significant difference among employees of different job title or rank using networking tools (df = 12, Chi-Square = 21.300, $p = 0.441 > 0.05$, most of the networking tool users were in non-managerial positions, 121/223 = 54%, and the next highest were in basic-level managerial positions. Fewer networking tool users were medium- and high-level managers, 42/223 = 19%).

DISCUSSION

It was found, depending on the job content type, differences existed in using networking tools as coordination media. The study results revealed among different networking using clusters, there was a significant difference in the user's interaction behavior and cognitive attitude. In addition, in terms of demographic variables, there was a significant variation in the education level among different networking using clusters, but there was no significant variation in gender, age, years of work experience, department, and job title and rank. When using the networking tools, the higher the interaction level, the higher the tendency, in terms of cognition, to use networking tools for coordination jobs. If the within-group variation is excluded, the interviewees all positively used networking tools for business purposes. It was therefore revealed, in the future, network use will be more intense and the dependency on network equipments will

be greater. According to the individual factors of each cluster, practical suggestions are provided as follows:

1) The followers and imitators (FI): This type of user is more aware of the services provided by networking tools and whether the tools could become a part of their work and life. Besides learning how to use new technology from colleagues who possess better knowledge related to the information network, this type of user also heavily relies on the tools to communicate with colleagues, and they often spend lots of time wandering in the cyber world. Undoubtedly, a company should provide software to the employees, but at the same time, the company should also put some limits on employees in using the Internet for non-work related affairs. As a result, this study suggests:

First, learn about Internet use restriction from other companies in the same business. Second, properly expand the computer network and invest in the facilities. Last, invest in smaller networking tool software.

2) The self-confident (SF): Users in this cluster believe networking tools can make the job interesting. It is important, they consider, for networking developers to consider user's convenience and flexibility. They are not very sensitive to the special functions provided by networking tools, but they highlight their individualized network image. They expect networking tools to bring convenience to them and give them a better quality of life. For business owners, they should make good use of the user's self-confidence by establishing a list of positive or negative networking conducts for the business operating environment. That is, which Internet behavior should be promoted and which behaviors should be banned. For example, could instant messenger be used for communicating with clients? Could instant messenger be used for sending sensitive information within the company? Because users of this type have a stronger professional esteem, one should avoid, under inappropriate circumstances, publically stopping those behaviors that have not yet been officially listed as negative conducts. On the other hand, those positive conducts that have not yet been officially listed should still be praised publically. As a result, this study suggests:

- i. First, make a list of Internet conducts that are considered negative.
- ii. Second, clarify network coordination and communication entities.
- iii. Last, enhance the information security management policy.

3) The technophiles (TP): The users in this group enjoy novel technology in their everyday lives; as a result, they are quite capable of keeping themselves updated on the new trends in technology. Because of their interests in technology, they require very little training from the company or from elsewhere, which saves their company some training expenses. Nonetheless, everything is a

double-edged sword. That is, if a company provides no restriction on the use of networking tools, then it may soon face a difficult or even embarrassing situation when the company's trade secrets appear.

Therefore, the business owners should enhance the information security management of the networking platform and find a balance between the privacy of the employees and the confidentiality of the network system. It is also important to think about establishing corporate policies for information security, designing appropriate managerial regulations, or even applying for ISMS (Information Security Management System, ISO 27001:2005) certification. This study suggests:

- i. First, make a list of Internet conducts that are considered positive.
- ii. Second, evaluate the use of networking tools with justification.
- iii. Last, encourage employees to share their Internet-related knowledge with others.

4) The mediocre and conservatives (MC): Because the users in this group are more conservative, they may resist new technology and are not interested in using new technology. People in this group often become a hindrance when a new technology is introduced into the company. Although new technology can improve their productivity at work, users in this cluster would rather find every possible way to escape it, for example, look for alternatives, or modify the existing tools, approaches or routines, instead of adopting the new technology. Although the company could reduce their fears of new technology by providing education and training, the core of the problem lies in multi-dimensional psychological issues. For the business owners, they may worry about job-hopping when investing too much money in those employees.

In this case, the study suggests the business owners prepare some response measures such as penalties and fines; otherwise, without a consistent corporate standard, some serious managerial problems may be develop in the long run. This study therefore, suggests:

- i. First, improve the capacity for network connection of the corporation.
- ii. Secondly, provide training courses related to network use.
- iii. Last, transfer the communication from the platform to the network.

LIMITATION AND SUGGESTIONS

This research adopted the questionnaire interviews to investigate the use of networking tools as coordination media in corporations in terms of the types of users and the users' interaction behaviors as well as cognitive attitudes. Nonetheless, there are some shortcomings due

to limited resources and staff. For instance, the study subjects were personnel (including managers) in the tourist business, but for each company, there might be very different backgrounds or different computer network constructions. As a result, variations may arise when filling out the questionnaire, depending on the companies and their situations. To achieve a general effect, this study strictly followed the scientific principle—the stratified random sampling method—when distributing the questionnaires to the study samples, that is, those business owners that have registered their company on the government's record. Four clusters were found in this study, and the study provided some suggestions to corporate managers on managerial practices. In recent years, due to the greatly enhanced convenience of network communication tools, competition in this market has become intense. All the companies in the networking field keep on updating their products or integrating the products with mobile commerce. By understanding the interaction behaviors and cognitive attitudes from the networking tool users, the business owners could facilitate the establishment of a model for correct network use. They could also use the information provided here as a reference for developing coordination tools in the future.

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Full Length Research Paper

The real exchange rate and the employment market: Evidence for Turkey by panel cointegration analysis

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The purpose of this paper is to investigate the relationship between real exchange rate and the employment market by using the panel cointegration analysis with the data of Turkey which is adopting flexible exchange rate regime for the period the study was done. According to the FMOLS and DOLS panel results, there is a cointegration between RER (real exchange rate) and aggregate employment. The FMOLS individual results indicate that except for mining and finance, there is a cointegration between RER and employment. DOLS individual cointegration test results rejects null hypothesis of no cointegration for all the employment variables except for mining and electricity.

Key words: Employment, exchange rate, cointegration.

INTRODUCTION

Labour market is highly affected by the behavior of the certain economy-wide aggregates such as inflation, the employment may increase in the low inflation environment contrary to the classical Phillips curve, and the monetary authorities try to stabilize the inflation. When the labour demand increases wages may go up as suggested by the Lipsey's labour market model and also increase the inflation. It is also expected that the labour market is affected by the level of the exchange rate. Exchange rate is the price of foreign currency, and has important consequences over the aggregate economy. The possible channels of exchange rate affecting the overall economy are allocation of resources, wealth and income effects, competitiveness, foreign balance, and price dynamics. The study gives brief information about these channels while discussing the results.

This paper chose to analyze the nexus of exchange rate and the employment market in Turkey which is a small-open economy. Turkey is one of the countries owning a negative real interest rate as at July, 2010 with Chile, Thailand, Czech Republic and Korea. Besides, in Turkey the unemployment increased from 10.3-14.5%

since at the beginning of Great Credit Crisis of 2008-2010. Turkey has started to adopt the flexible exchange rate regime since 2002. However, Turkey historically fixed the exchange rate at appreciated levels in the past (Berument, Coşkun and Şahin, 2007) and Central Bank of the Republic of Turkey (CBRT) had targeted the level of exchange rate for the pre-2001 crisis because exchange rate and so many goods in the inflation basket is dependent on the energy prices. During the recent Great Credit Crisis of 2008, Turkey had benefited from the flexibility of the exchange rate.

Theoretically, the central bank applying flexible exchange regime does not prefer to intervene to the level of exchange rate. However, the economic targets such as inflation stabilization or growth oriented sectors are all related with the exchange rate. For this purpose, during the post-2008 economic crisis, the actors in the market have started to mount pressure on the Central Bank of the Republic of Turkey (CBRT) to depreciate the price of foreign currency in terms of Turkish lira (TL). Considering its importance, the study tries to estimate the effect of exchange rate on the employment level.

The sectors may also be affected with a different degree from the exchange rate. For this purpose the study also considered the sub-components of employment market. The sectors considered are agriculture, mining, industry, electricity, construction, retail, transportation,

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finance and society. Some of the goods produced in these sectors are more tradable hence their prices are determined by the world demand and supply. According to Frenkel and Ros (2006), real exchange rate (RER) effects the capital accumulation in the traded sectors by influencing the profitability. However, the price of the non-tradable goods is determined by the domestic supply and demand conditions.

The paper aim to explore the effect of the RER on the employment, so the other possible determinants of the employment such as wage, output and cost of labour are considered under constant term. See for instance Klein (2003) for a typical estimation of the labor demand function. Most of these papers estimate their specifications for the developed countries, but less for the developing countries.

LITERATURE REVIEW

There are several papers considering the negative effects of the appreciation of exchange rate on employment. Edwards (1989) claims that an appreciation in RER decreases the employment in manufacturing sector. Burgess and Knetter (1998) find that the real appreciation leads to a decline in employment. According to Faria and Ledesma (2005), the long-run equilibrium effect of the RER on employment is through the openness channel. According to them, the appreciation of the real exchange rate leads to a decrease in employment with an elasticity of between -0.5 - -0.2. Fan and Song (2006) claims that the depreciation of exchange rate increases employment for China. An appreciation in renminbi decreases the manufacturing employment and depreciation of RER increases the employment. Hua (2007) mentions the effects of real appreciation on employment through the technology, export volume and efficiency channels and finds a negative effect of real appreciation of the renminbi on the manufacturing employment. Increasing (appreciating) RER can reduce the employment through decreasing export competitiveness or increasing import competition as mentioned by Demir (2010), Campa et al. (2001) and Klein et al. (2003). When RER appreciates the level of exports may diminish and the price of domestic goods becomes more expensive relative to the foreign goods. Oskooee et al. (2007) claims that the net effect of exchange rate appreciation on the employment level depends on the level of rigidity and the import dependency level of the country. According to them, RER has a short term effect on employment, but in the long-run the net effect is neutral.

Campa and Goldberg (2001) find that the depreciation of US dollar increases the employment in the manufacturing sector. According to Frenkel (2004), a depreciation of RER leads to a higher output through export channel. Filiztekin (2005) tells that the effect of the depreciation of foreign currency on employment is negative; moreover the devaluations diminish the employment. According to

him, 10% depreciation of the TL results in 1.6% decline in the manufacturing employment.

Some papers considered the effects of employment volatility. Demir (2010) uses at the firm level panel data set for the period 1983-2005 to explore the effect of exchange at volatility on employment creation. One standard deviation appreciation in RER volatility reduces employment growth in the range of 1.4 - 2.1 percentage points.

Chen and Chen (2007) explores a negative relationship among the productivity differential between domestic and foreign productivity, and the exchange rate. Alexandre et al. (2010) shows that the open sectors owning a low level of technology and low labour rigidity are more sensitive to the exchange rate movements. High level of the labour adjustment costs and the productivity may reduce the sensitivity of exchange rate on the employment. Besides an increase in the openness level and the persistence of exchange rate increase the impact of the exchange rate on employment.

Some papers considered the sectoral diversifications. The appreciation of the US dollar diminishes the employment growth in construction and at the aggregate level, however, increases the employment growth in the mining sector according to Kandil and Mirzaie (2003). Ngandu (2009) analyses the effect of the exchange rate for South Africa employment figures, and finds that the appreciation of the rand on employment is negative for the tradable goods but not for the non-tradable goods.

According to Ngandu (2008), a reduction in RER increases the demand for machinery by importing and causes a reduction in employment in tradable sectors. When the foreign goods are defined in terms of RER, a change in RER in an open economy will change the relative prices of the interval goods and albeit the capital, the price of labour will change. In this sense, the change in RER from the equilibrium will change the behavior of the households. A diminish in the RER, if the other things being equal, will diminish the price of the imported goods and the capital goods in terms of domestic currency. Consequently the producers will substitute the labour force by the machinery. In this sense the employment level in tradable sectors diminishes because of the reduction in the imported interval goods prices. The shift of factor composite from the labour to the imported inputs will increase the labour productivity and the RER will affect the employment by the technology channel (Hua, 2007).

In an open economy, an increase in RER diminishes the domestic non-tradable goods and increases the profit margin and investment. Therefore, this may create an employment and increases the capacity usage by the export channel (Gala, 2008). However, according to Edwards (1989), an increase in the RER diminishes the wages and the output in the developing countries. Edwards claims that an increase in RER creates negative balance effect by the price mechanism and the output diminishes. Secondly, an increase in RER causes a transfer of

income from the people owning low marginal propensity to saving rates to high marginal propensity to saving rates. Thirdly, if the price elasticity of an export and an import is low, the trade balance will be worsened by the domestic currency and this may cause an economic recession. At the same time, an increase in RER will increase the price of the interval goods and the supply curve will shift to the left and the output will diminish (Fan and Song (2006).

Agenor (2007) claims that in the developing countries, most of the interval goods are imported. These interval goods are the capital goods. Consequently, an increase in RER may cause a contracting effect on the output by the increase in imported price of goods. In this context, there may be cost inflation. A diminish in the RER is not an increase in the domestic prices relative to the foreign prices. At the same time this is a change in the domestic price structure and an increase in the non-tradable goods price compared with the tradable goods (Jeanneney and Hua, 2010). A diminish in RER increases the real wages but this increase will be differential among the sectors. A diminish in RER will cause diminish in the prices of foreign imported capital and interval and technology goods. An increase in RER diminishes the relative price of the foreign goods, and the exports decrease and the competitiveness increase in the imported sectors. A diminish in RER increases the labour productivity and the input costs diminish. Over the given goods prices the wages increase. The relative wages affect the interval goods, technology and the prices of the capital according the interaction with the qualified and unqualified workers. The factor demand consequently the labor demand is a positive function of real output prices and the RER affects the wages. An exporter and the domestic producer diminish the nominal exchange rate and the prices of the foreign goods and make a production and sales plan. An increase in the prices of the foreign goods increases the demand for goods and assuming that the change in nominal exchange rate is fixed, increases the domestic good demand of the firms and this increase increases the relative prices of the domestic goods. Consequently, the factor demand curve is a negative function of the RER and the firms diminish their factor demand if the RER diminish and face with the import competitiveness (Robertson, 2003).

A diminish in RER decreases the cost of the imported interval goods and the inputs. The low cost of the foreign inputs cause an output effect and the demand for the other all production factors increase. Also depending on the substitution degree between the imported inputs and the domestic inputs, this will create a substitution effect. An increase in RER diminishes the domestic price level and the real wages increase because of the diminish in the overall prices. The effect of RER on the labour demand and wages will be determined according to the supplementary relationship between imported interval goods and the imported input and labour. The effect of the reduction in RER on the labour demand will be

determined according to the prices of the domestic goods and supplementary relationship. A diminish in RER will decrease the imported prices of interval goods and this will marginal product value of the labor and consequently the labour demand (Kandil and Mirzaie, 2003). In this sense, RER effects the economic development. In a case of a diminish in RER effecting the real wages, the price of the non-tradable goods decrease and this causes a high real wages and low profit margin and high consumption and low investment (Gala, 2008).

RER affects the employment also in terms of the development. Balassa-Samuelson claims that the competitive RER promotes sales in the international markets (Juselius and Ordonez, 2009). Consequently firms make more investment and the economic growth sustains by the domestic labour. Kaldor (1978) claims that in an open economy, RER is an important variable effecting the development. According to him a reduction in RER stops the industrial activities in developing countries and it blocks the productivity channel. The resources in the economy shifts from the low productive labour intensive sectors to high productive sectors in the industry. Consequently, according to Kaldor, the industrial activities in the developing countries are not in a demanded level. In this situation, the excess labour force in the market cannot be absorbed. According to Williamson (2003), a competitive RER encourages the production of industrial goods and sustains development of the developing countries by the technology channel. According to Palma (2003), the learning by doing and cumulative technological development highly depends on the growth of the industry.

The supply and demand channels may work reverse of the employment market for a small-open economy concerning the effects of exchange rate. Supply side considers the production components, and costs such as wage and oil prices. However, the demand side is related with the foreign trade. Gylfason and Schmid (1983) constructs a macroeconomic model and claims that the devaluation affects the output by cost of imported oil (supply side) and foreign trade expenditures (demand side). They support the view that the devaluation has positive effects on production. Klein et al. (2003) decomposes the RER to trend and cyclical components. They find that the trend component does not have net employment growth effect but changes the allocation structure. An appreciation of the cyclical component of RER effects the net employment growth negatively.

MATERIALS AND METHODS

The study employs Turkish quarterly data for the period 2003: Q1 – 2009: Q4. All the data for the variables aggregate employment and the disaggregated employment for the agriculture, mining, industry, electricity, construction, retail, transportation, finance and society sectors, gross domestic product and the real exchange rate are obtained from the Central Bank of the Republic of Turkey Electronic Delivery System. All the variables are in logarithmic form.

The study preferred to use the real exchange rate (RER) rather than the nominal exchange rate.

The latter measures the units of a foreign currency can the one domestic currency buy. For some explanations we will use e = USD/TL parity for the bilateral nominal exchange rate. Therefore, nominal depreciation expresses an increase in the nominal exchange rate e . If e increases, the price of domestic goods becomes cheaper for the foreign consumers. By the nominal depreciation of nominal exchange rate, the price of domestic goods increases by the cost inflation and the real wages diminish.

On the other hand, the RER gives us unit of the foreign goods where a one unit of domestic good can buy. Simply it is the price of domestic goods relative to foreign goods.

The study uses the RER definition in equation 1 throughout the text. CBRT calculates RER index as the geometric mean of the ratio of Turkish aggregate price level to the aggregate price levels where Turkey has a trade relation.

$$RER = \prod_{i=1}^N \left[\frac{P_{TUR}}{P_i * e_{i,TUR}} \right]^{w_i} \quad (1)$$

Where, w_i represents weight of the the country i 's in Turkey's RER index. P_{TUR} is the price index of Turkey. P_i is the price index of the country i . $e_{i,TUR}$ is the exchange rate of the country i in terms of TL. N is the number of countries involved in the analysis. According to the equation (1), an increase in the RER indicates an real appreciation of TL, the price of the Turkish goods increase in terms of the price of the foreign goods (Saygili et al., 2010, p. 17). The domestic prices highly effects the value of the RER. For instance, according to Saygili et al. (2010, p. 21), when they decompose the RER index into its subcomponetns, they indicate that the appreciation had been caused by the domestic price movements.

An increase in P_{TUR} contributes nearly 79% to the appreciation of RER. The foreign prices tend to diminish by 18%.

The integration of the variables is the first step in cointegration test. Since the study tries to obtain a stationary combination of several variables initially, panel unit root tests have been performed with the specifications of Levin et al. (LLC, 2002) and Im et al. (IPC).

The null hypothesis is the unit root and the alternative is the stationary of the data. Equation (2) is estimated for the Levin et al. (2002, LLC) panel unit root test. $\{y_{it}\}$ is a sequence and $i = 1... 10$ is for the ten employment categories and the real exchange rate included in the model. $t = 1... T$ is the number of observations.

$$\Delta y_{it} = \delta y_{it-1} + \sum_{L=1}^{p_i} \theta_{iL} \Delta y_{it-L} + \alpha_{mi} d_{mi} + \varepsilon_{it} \quad , m=1,2,3. \quad (2)$$

$$Employment_t = Constant + \alpha_1 GDP_t + \sum_{i=0}^4 \beta_i RER_{t-i} + \alpha_2 Trend + \alpha_3 D1 + \alpha_4 D2 + \alpha_5 D3 + \varepsilon_t \quad (3)$$

GDP denotes for the real gross domestic product and the employment variable represents the aggregate employment and the nine employment categories the study employed. The results partially support the Frenkel (2004) whom claims that there is a negative relationship between unemployment and RER for Argentina,

This test has similarities with the Augmented Dickey Fuller Test (ADF), which is implemented for each individual i . The lag order changes for each variable. The vector of deterministic variables is

d_{mi} and the vector of coefficients for the deterministic model is α_{mi} . There are three possible deterministic terms: $d_{1t} = \emptyset$, $d_{2t} = \{1\}$, $d_{3t} = \{1, t\}$. The null hypothesis is $H_0 : \delta_1 = \delta_2 = \delta_3 = \dots = \delta_{11} = 0$ and the alternative hypothesis is $H_a : \delta_1 = \delta_2 = \delta_3 = \dots = \delta_{11} \neq 0$ for LLC. LLC assumes that the unit root process is identical across cross sections of the data. If the study is not able to reject the null of a unit root which claims that each individual time series contains a unit root. In this case all individuals in the panel would be integrated.

Next Im et al. (2003, IPS) panel unit root test is applied to evaluate the robustness of the results with LLC. The main difference of IPS from LLC is that IPS allows varying coefficient for

y_{it} . They simply take an average of t -statistics obtained from individual series. Again the null hypothesis is that panel data

contains unit root $H_0 : \delta_1 = \delta_2 = \delta_3 = \dots = \delta_{11} = 0$. But the alternative is different, where some of the individual series contain unit root. So the study partially observes flexibility in IPS compared with LLC. Besides, according to Maddala and Shaowen (1999) for the research questions such as convergence of a dozen of countries in terms of economic growth, the null specification of LLC needs to be questioned. Similarly the heterogeneity across employment categories is valid. So assuming a common unit root process may be so strict for the data employing. Rather assuming an individual unit root tests process may be tested. Of course it is an economic question or depends on which school of thought you consider. For instance, according to the neoclassical view of growth, if the technological process is identical across countries, then they will converge. For the subject, it is clear that the growth rates of the employments are not the same. At least it is known from the agriculture and the government sector employment figures. The results of the panel unit root tests are presented in Table 1.

According to the results of LLC and IPS tests with individual intercept and trend, the study fails to reject the null of unit root and it is concluded that the panel data is integrated in order one. When the study takes the first difference of the variables, the study rejects the null of unit root. The study therefore, may examine the long-run relationship between ten employment categories and the exchange rate with panel cointegration analysis.

The hypothesis testing phase of the empirical economics is critical. This gives an opportunity to pre-evaluate the issue and get into details and the core subject. For an initial hypothesis making, the study estimated the Frenkel (2004) specification presented by equation 3. Audgmented Dickey Fuller test were used to determine the stationarity of the variables. The results are presented in appendix A in the appendix. It is concluded that the variables are integrated in order one.

Brazil, Chile and Mexico. There is a simultaneous negative and significant relationship between RER and construction, transportation, finance and society. However, when the lagged values of the RER are considered, the real appreciation increases the total, construction and retail employment categories.

Table 1. LLC and IPS panel unit root tests estimation results.

Method	Individual intercept	Individual intercept and trend	None
Level			
Levin Lin and Chu	-2.0776* (0.018)	0.0883 (0.5352)	3.1941 (0.9993)
Im, Pesaran and Shin	-2.4454* (0.0073)	-0.7448 (0.2272)	
First difference			
Levin Lin and Chu	-4.0162* (0.0000)	-11.5336* (0.0000)	-11.1979* (0.0000)
Im, Pesaran and Shin	-9.4973* (0.0000)	-18.2040* (0.0000)	

P-values are reported in parenthesis. Schwarz Information Criteria (BIC) was used to select the information criteria. * Indicates the rejection of unit root.

The results presented in Table 2 for the specification 3 indicate that it is meaningful to search for a possible cointegrating vector with the RER and the employment categories. If the two time series are both non-stationary then it may be possible to create a linear combination of the two series which is stationary and which can be said to be cointegrated. The study uses fully modified ordinary squares (FMOLS) and dynamic ordinary least squares (DOLS) methods to search for a possible stationary combination. FMOLS is suggested by Pedroni (1996) and its critical values can be found in Pedroni (1999). Petroni (2001) and Pedroni (2004) are good sources for the details of the test. DOLS is suggested by Kao and Chiang (1997) and Mark and Sul (1999) and it is proposed in their paper that it has the same asymptotic distribution as the panel FMOLS estimator. The basic panel cointegration is based on the equation (4) and has a null hypothesis of no cointegration.

$$Employment_{it} = Constant_i + \beta_i RER_{it} + \mu_{it} \quad (4)$$

Again for the employment variable, the aggregate employment and the nine sub-categories are employed to catch the possible heterogeneity, $t = 1 \dots T$ is the number of observations. The null hypothesis $H_0: \beta_i = 1$ is for all i and $i = 1 \dots N$ is the total number of the horizontal cross-section in the panel. Common time dummies are not included into the specification because the non-invertible matrix would be obtained otherwise. These tests allow heterogeneity in the cointegrating vector.

Table 3 reports the results for the panel cointegration tests. Individual FMOLS and DOLS estimates and t statistics for $H_0: \beta_i = 1$ are reported in the entries. At the bottom of the table the panel estimators results are reported.

According to the FMOLS and DOLS panel results, there is a cointegration between RER and overall employment. The FMOLS individual results indicate that except for mining and finance, there is a cointegration between RER and employment. DOLS individual cointegration test results rejects null hypothesis of no cointegration for all the employment variables except for mining and electricity.

As a robustness check for the cointegrating relationship between RER and employment, Johansen trace test is applied (Johansen, 1988 and 1991). They use maximum likelihood methodology to estimate the cointegrated vectors. The numbers of cointegrated

vectors are given in Table 4. These cointegrated vectors are also the rank of the coefficient of the one lagged value of the dependent variable. If the rank of the matrices is zero than the study fail to reject the null of no cointegration and there is no stationary linear combination. The study also estimated with the different deterministic specifications. The details of the likelihood ratio test based Johansen trace statistics can be found briefly in Hjyalmarsson and Österholm (2007). According to the results of Johansen trace cointegration test, there is a cointegration between RER and the employment categories except for mining with quadratic trend and intercept. The results may change by the assumption for the trend and intercept.

RESULTS

When we considered the effects of real exchange rate on the employment by sector there is a distinction between tradable and non-tradable sectors. The results are not surprising: for most of the sectors GDP and trend are significant when regressed on employment. In half of the sectors RER is significant and surprisingly in non-tradable sectors like construction and transportation, RER is insignificant in several tradable sectors.

This paper represented an empirical examination of the relationship between real exchange rate and the employment in Turkey. The study employed panel unit root tests and panel cointegration using the data spans the period 2003:1 - 2009:4. The paper attempted to make a contribution to the vast literature of contractionary depreciation/devaluation by offering insights Turkish sectoral data. The real exchange rate and the aggregate employment are cointegrated. When sectoral employment data is used, FMOLS shows cointegration between real exchange rates and all the sectors except mining and finance. Similarly, DOLS reveals the presence of cointegration for all the sectors except in mining and electricity. This empirical estimation constitutes useful work that has

Table 2. The estimation results for Frenkel (2004).

Sector	Constant	GDP _t	RER _t	RER _{t-1}	RER _{t-2}	RER _{t-3}	RER _{t-4}	Trend	D1	D2	D3	R ²	BIC	DW
Total	6.1374*** [7.0359]	-0.2746** [-2.1644]	-0.1969 [-1.6432]	0.2969* [1.6602]	0.0159 [0.0852]	-0.2094 [-1.2129]	0.1928* [1.7686]	0.0008 [1.3563]	-0.0436*** [-4.4303]	-0.0047 [-0.5922]	0.0233*** [2.6454]	0.8074	-5.1614	1.3115
Agriculture	16.4685*** [5.3367]	-1.8175*** [-4.0489]	-0.4411 [-1.0403]	0.5928 [0.9369]	0.0794 [0.1205]	-0.4979 [-0.8153]	0.6074 [1.5750]	-0.0006 [-0.2834]	-0.1580*** [-4.5396]	-0.0201 [-0.7092]	0.1171*** [3.7563]	0.8247	-2.6344	1.2110
Mining	-10.7806*** [-6.4383]	1.7009*** [6.9833]	0.0259 [0.1125]	0.0198 [0.0575]	0.0024 [0.0067]	0.2743 [0.8277]	-0.1234 [-0.5896]	-0.0067*** [-5.8401]	0.0382** [2.0222]	0.0079 [0.5158]	-0.0676*** [-3.9942]	0.8683	-3.8572	1.7821
Industry	-0.6287 [-1.0955]	0.5940*** [7.1155]	-0.0035 [-0.0439]	0.0396 [0.3364]	-0.0399 [-0.3254]	-0.1212 [-1.0669]	0.0573 [0.7991]	-0.0005 [-1.1565]	0.0127* [1.9583]	-0.0031 [-0.5927]	-0.0252*** [-4.3491]	0.9018	-5.9987	1.0581
Electricity	-2.9309 [-0.8632]	0.2865 [0.5801]	0.3787 [0.8118]	0.3025 [0.4345]	-0.6003 [-0.8281]	0.8233 [1.2251]	0.4855 [1.1440]	-0.0052** [-2.2247]	0.0135 [0.3513]	0.0214 [0.6860]	0.0003 [0.0087]	0.6661	-2.4432	1.0268
Construction	-2.1946*** [-2.7804]	0.7582*** [6.6035]	-0.4814*** [-4.4387]	0.5003*** [3.0912]	0.0219 [0.1299]	-0.0903 [-0.5781]	-0.1262 [-1.2791]	0.0022*** [4.0332]	-0.0579*** [-6.5084]	0.0221*** [3.0509]	0.0020 [0.2498]	0.9855	-5.3613	2.3517
Retail	1.3350 [4.5720]	0.3100*** [7.2979]	-0.0486 [-1.2127]	0.1468** [2.4516]	-0.0952 [-1.5278]	0.0940 [1.6264]	-0.0910** [-2.4946]	0.0007*** [3.3409]	0.0057 [1.7391]	0.0081*** [3.0313]	0.0002 [0.0582]	0.9731	-7.3502	2.2205
Transportation	1.8655* [2.7972]	0.1561 [1.6089]	-0.2398*** [-2.6169]	0.1717 [1.2556]	0.2137 [1.5014]	-0.0535 [-0.4056]	-0.0721 [-0.8655]	-0.0007 [-1.4921]	-0.0096 [-1.2802]	-0.0020 [-0.3338]	-0.0058 [-0.8656]	0.8004	-5.6983	2.7621
Finance	2.6592*** [3.1902]	-0.0436 [-0.3593]	0.3208*** [2.8014]	0.0077 [0.0450]	0.0206 [0.1158]	-0.2104 [-1.2755]	0.0994 [0.9545]	0.0107*** [18.7592]	-0.0028 [-0.2943]	0.0120 [1.5684]	0.0167** [1.9868]	0.9893	-5.2523	1.8264
Society	2.6305*** [6.1338]	0.1352** [2.1675]	-0.1294** [-2.1958]	0.0818 [0.9305]	0.0468 [0.5111]	-0.0210 [-0.2479]	-0.0380 [-0.7100]	0.0025*** [8.6361]	0.0080* [1.6467]	0.0041 [1.0512]	-0.0261*** [-6.0219]	0.9608	-6.5814	1.1773

t- statistics are reported in brackets. ***, ** and * indicate significance at the 1, 5 and 10% level respectively.

a potential to inform exchange rate or industrial policy in the case of Turkey.

Our results are consistent with the findings of Frankel and Rose (2006), Riberto et al. (2004) and Galindo et al. (2007) claiming that an

appreciation in RER may effect the employment creation negatively. There are several possible channels of RER affecting the employment figures. RER is a mechanism giving an opportunity to make decisions on the consumption and the

resource allocation between tradable and non-tradable goods as mentioned by Dornbusch (1987).. Consequently RER has macroeconomic and microeconomic effects on the employment and production (Grubacic, 2000). It can be claimed

Table 3. Cointegration test results.

Sector	FMOLS	t-stat	DOLS	t-stat
Total	-0.0154	-13.2992**	-0.1359	-18.7228**
Agriculture	-1.0121	-5.1253**	-2.1229	-22.6444**
Mining	0.6112	-1.1049	0.8342	-1.1728
Industry	0.2509	-6.7583**	0.5895	-11.5497**
Electricity	0.2588	-2.1842*	0.7232	-1.3843
Construction	0.6062	-1.7920*	0.7129	-2.2324*
Retail	0.3170	-7.1089**	0.4798	-16.9371**
Transportation	0.0869	-13.3077**	0.0640	-30.5439**
Finance	1.5035	1.1969	2.3468	6.7071**
Society	0.3147	-6.1010**	0.6289	-5.2400**
Panel result	0.2921	-17.5774**	0.4121	-32.7992**

T-stats are for $H_0: \beta_i = 1$. ***, ** and * indicate significance at the 1, 5 and 10% level respectively.

Table 4. Johansen cointegration test results.

Sector	None trend, no intercept, no trend	None trend, intercept, no trend	Linear trend, intercept, no trend	Linear trend, intercept, trend	Quadratic trend, intercept trend
Total	0	0	1	0	2
Agriculture	0	0	1	0	2
Mining	0	0	0	0	0
Industry	0	0	2	0	2
Electricity	0	0	2	1	2
Construction	1	1	1	1	2
Retail	0	0	2	0	2
Transportation	0	0	0	0	2
Finance	2	0	0	1	2
Society	0	0	0	1	2

Trace statistics are used to evaluate the results. Critical values based on MacKinnon-Haug-Michelis (1999)

that the relationship between RER and employment is indirect. Because RER initially effects the relative price structure. The changes in the relative price structure effect the production and consequently the employment. The competitiveness determines the basics of this relationship. Consequently RER affects the real wages by the price channel and it is one of the important determinants of the employment.

An increase in RER means that the prices of goods increase by the national currency. increase. After the economy opens its doors to the world, when it is assumed that the domestic prices is a function of RER, the domestic consumer will consume both domestic and foreign products and the ratio of the prices between these goods will determine the increase or decrease in the RER (Lindblad and Sellin, 2008). Consequently, the difference between the consumer and the producer prices can be expressed by:

$$P_C - P = (1-w)(1+p^*-p)$$

Where, P_C is the consumer prices, P is the producer prices, w is the weight of domestic good and service in the consumption basket. By the assumption that the prices and wages are rigid in downward, the increase in RER will increase the consumer prices and this will increase the nominal wage level. The real wages will increase and the labour demand will diminish. However, this is valid for the open economies and if the markets are not perfect. Because if the factor market is not perfect, the labour will not get a wage equals to the marginal product of labour and the wages will be determined by the bargaining by the labor unions and the employers (Layard and Nickell, 1999).

Conclusion

When the real exchange rate diminishes, Turkish Lira buys fewer units of foreign goods so called real depreciation. Price of domestic goods decrease when real exchange rate diminishes (depreciation). When the price

of the domestic goods increase relative to foreign goods, real exchange rate appreciates, increases and can buy more units of foreign goods. Therefore, an increase in real exchange rate in theory increases the competitiveness of the country. However, for the countries such as Turkey an increase in real exchange rate may diminish the net exports if the exports are dependent to the imports. So the appreciation of foreign currency may or may not hurt the exports of the country. Normally the study expects that if the Turkish lira buys more dollar than before (if the Turkish lira strengthens) US goods will become cheaper in terms of Turkish lira. Some of the papers call this as import oriented growth. Turkey mostly imports by using US dollar, however, a dense of its exports are to European Countries by Euro. This is similar but different explanation within J-curve. Besides, an increase in RER may decrease the availability of the technology. The price of machinery becomes much more expensive. Considering the convergence hypothesis, this may rebound to the growth figures negatively. Technology increases the human capacity, so the average labour productivity increases.

There are tradable and non-tradable sectors creating employment at different degree by their own differential persistency degrees. The tradable goods Turkey takes the prices at the market as given and they can be exported and imported. However, the non-tradable goods are consumed where they are produced. Agriculture, mining, industry, retail, finance are tradable sectors and the electricity, construction, transportation are non-tradable sectors.

An increase in investment and government expenditures shifts the total demand curve up. However, if the real wages diminish the supply curve shifts to the right. When the nominal wages are constant, if RER increases, the prices also go up and the real wages diminish. This means when the RER increases, the production level also stimulates. However, if the RER increases, the other production costs also increase consequently aggregate supply curve shifts to the left. The net effect of RER is for the countries like Turkey is that the aggregate supply curve shifts to the left and the production level diminishes. Because the import costs effect the export costs and these effects the volume of import and the cost inflation effects the employment negatively. When the wages increase, the profits of the firms diminish and the supply curve shifts to the left. This causes a close in inflationist gap in Keynesian economics. The long run aggregate supply curve and the short term equilibrium production intersect and the economy comes to the equilibrium level.

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APPENDIX**Appendix A.** Stationary tests.

Variables	Constant	Constant, Linear trend	None
Total	-1.9755	-1.8641	0.2548
Agriculture	-2.0223	-1.3856	-0.4351
Mining	-2.3021	-2.4710	0.3093
Industry	-1.7087	-0.7928	0.9317
Electricity	-3.5668*	-3.7362**	-0.5279
Construction	-2.7635*	-1.7962	1.5123
Retail	-1.9814	0.5292	0.9809
Transportation	-2.8178*	-3.9625**	0.7126
Finance	0.4197	-2.3164	2.4342**
Society	0.2765	-1.3970	2.1706**
Rer	-2.2396	-3.3317*	0.2649
GDP	-1.7131	1.3861	0.6888

* implies that the variable is significant at 5% level. SBC criteria are used for the lag section.

Full Length Research Paper

The relative strength index revisited

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The relative strength index (RSI) is one of the best known and most widely used technical analysis indicators. In this paper, the study aim to empirically test the functioning of the RSI in its classic form, on a set of data and to reconfigure the indicator by also taking account of the trading volume in its calculation formula. After adjusting the RSI with the trading volume, the study will test its new form on the same set of data. Finally, it will compare the obtained results by applying the classic form of the indicator with those obtained by using the adjusted form. In future research, the study intend to analyse whether higher yields can be obtained by using the RSI compared to those which result from applying the buy and hold strategy.

Key words: Technical analysis, fundamental analysis, technical indicators, stock market, financial forecasting, S&P 500 (Standard & Poor's 500).

INTRODUCTION

In order to provide a sharpened focus on the research problem and the need of the study, the introduction is divided as follows (Alam, 2011).

Research problem

Technical analysis of the stock market is a way to forecast the future evolution of stock prices, taking into account their past and including a multitude of highly varied techniques. This kind of analysis implicitly assumes that there is a dependency between the future price and its past values. In other words, changes in stock prices from the past are important in order to forecast their future evolution.

In the past, technical analysis has been highly used on capital markets around the world and continues to be similarly used at present. That does not mean that the use of various technical analysis methods has not or has not had its fervent opponents.

Through the ideas expressed in this paper we take the side of the technical analysis advocates both due to the obtained results and to an argument of a more general nature, namely that the market uses the various tools of technical analysis since many decades. If some of these would not have yielded any result within such a long period of time, they would have been certainly long forgotten. Thus, the study also support the idea that certain instruments used in technical analysis to study the future evolution of prices - namely the forms of the RSI –

are more sensitive to market reactions for the study of which they were created compared to the general statistical tools and, therefore, more accurate when used for the capital market analysis.

Research aim and objectives

In this paper, the study aim to empirically test the functioning of the RSI in its classic form, on a set of data and to reconfigure the index by also taking account of the trading volume in its calculation formula. After adjusting the indicator with the trading volume, the study will test its new form on the same set of data. Finally, it will compare the obtained results by applying the classic form of the indicator with those obtained by using the adjusted form. In future research, the study intend to analyse whether higher yields can be obtained by using the RSI compared to those which result from applying the buy and hold strategy.

Research questions

In order to achieve the aim and objectives of this study we will answer the following questions: The first question is whether the enounced research problem was studied before, and if it was, which were the most important researches in the field and what were the conclusions of these researches. The second question is which are the

materials and methods needed to be used in order to test the functioning of the RSI and which is the most appropriate form of the index: the classic form or the new one. To get an answer to this second question it must be established what set of data should be used to test both RSI forms and to determine which of them is the most efficient. Afterwards both RSI forms should be tested on the chosen data set. The third question that arises is what the original results of the study are, how they contribute to the development of the knowledge in the business field and how they could be used.

LITERATURE REVIEW

In the economic literature, the moments when the opponents and critics of technical analysis seemed to gain ground have alternated since the middle of last century (Alam, 2009). Fama (1965a) asserts that there are two approach categories of those who try to predict the future evolution of the shares' trend: the chartist approach, which involves the use of technical analysis and the fundamental analysis theory. Both assume that the prices of shares can be reliably estimated for a certain future period, but the techniques used in these theories are different. If chartists study the behaviour of prices in the past in order to determine how they will evolve in the future, the advocates of fundamental analysis attempt to determine the intrinsic value of the shares according to their capacity to generate returns and if the current price is below or above their intrinsic value (Alam et al., 2009, 2010). The hypothesis from which fundamental analysis departs is that in time, the price of stocks has a tendency towards their intrinsic value.

In antithesis to both technical analysis and the fundamental analysis is the theory of random walks. According to traditional approaches, on the efficient capital markets, characterized by the existence of a large number of rational competitors pursuing the maximization of profit and having real-time access to market information at almost no cost, the current price of a stock at any given time reflects both the information generated by past events as well as information related to events known to occur in the future. For this reason, the advocates of the random walks theory argue that the future development of the rate cannot be forecasted. A large number of studies conducted in the middle of last century using classical statistical tools support the theory of random walks through the obtained results, or, even if they admit the existence of a certain dependency between past and future stock prices, consider that it is much too small in order to be used for the obtaining of profits that are higher than trading costs. In this respect we mention the papers of Kendall (1953), Cootner (1962), Godfrey et al. (1964), Fama (1965b), Jensen and Benington (1967).

But there are also studies like those written in the same period by Alexander (1961) and Levy (1967) whose

authors provide, through the obtained results, arguments for the use of various categories of instruments specific to technical analysis.

If the first academic papers in the field of technical analysis were mostly subordinate to the idea of its uselessness, even considering it an "anathema for the academic world" (Malkiel, 1981). In the last period of time, the efficient markets hypothesis has been reviewed (Timmermann and Granger, 2004) and the ratio of forces has changed. Many papers show the existence of a link between past developments and future evolutions. Studies such as those published by Sweeney (1988), Jegadeesh (1990), Brock et al. (1992), Chopra et al. (1992), Gencay (1997), Dempster and Jones (2001), Austin et al. (2004), Grant et al. (2005) are relevant in this respect. Recently, the opponents of the technical analysis concept have become opponents of the various techniques of analysis in use. For example, Marshall et al. (2006), remark the inefficiency of the candlestick trading strategies on Dow Jones Industrial Average stocks during the period between 1992 and 2002. Nevertheless, this result does not confirm the inefficient putting into practice of this strategy or of other trading strategies on different stocks, markets or periods.

MATERIALS AND METHODS

The classic form of the RSI

The RSI is a commonly used oscillator in technical analysis because of its ease of use and interpretation. In its classic form, it was developed by Welles Wilder Jr. (1978) and presented by him in the book "New Concepts in Technical Trading Systems" and in "Commodities Magazine" published in June of the same year. The RSI involves comparing the increase of the closing prices with their falls within a certain period of time.

The term is often used to highlight the relative strength of a security in relation to the market on which it is traded or with a different security. This is the reason why, in order to avoid confusion between the Relative Strength Index, an index reflecting the relative strength of the price of a security in relation to itself and the term relative strength explained before, many authors use only the abbreviation RSI for the Relative Strength Index.

To determine the RSI, the increase of the closing price (upward change) (U) or the decrease of the closing price (downward change) (D) are calculated for each day, according to Formulas (1) and (2).

$$U_{close} = close_{today} - close_{yesterday} \quad (1)$$

$$D_{close} = close_{yesterday} - close_{today} \quad (2)$$

If U is positive for a certain day, then D is replaced with 0 for that day and vice versa, if D is positive for a certain day, then U is replaced with 0 for the respective day.

In order to calculate the RSI, an exponential moving average (EMA) is determined for U and for D using a "multiplier" (α) calculated based on a certain number of days (N). The moving average is used to limit the influence of random factors, unusual for the average. The number of days recommended by Wilder in his

book mentioned earlier is 14, but the EMA formula presented by him in the same book corresponds to N equal to 27. EMA is determined using the α "multiplier" in order to associate different degrees of importance to the data considered in the calculation, depending on their age. Thus, older data will weigh less in the EMA, and the latest data will weigh more.

The α "multiplier" is determined in relation to N number of days, according to Formula (3).

$$\alpha = \frac{2}{N + 1} \tag{3}$$

For example, for a number of days equal to 27, α is 1/14. The determination of EMA requires the calculation of a simple arithmetic average (SMA) of the data for the first N days in the string under consideration, according to Formula (4).

$$SMA_N = \frac{X_1 + X_2 + \dots + X_N}{N} \tag{4}$$

Where: SMA_N - the arithmetic average of a string of data corresponding to a number of N days; X_N - the value corresponding to the N day from the data string. When determining RSI $X = U$ or $X = D$.

The exponential moving average of the N+1 day is determined as follows (previously used notations are maintained):

$$EMA_{N+1} = \alpha \times X_{N+1} + (1 - \alpha) \times SMA_N \tag{5}$$

After determining the exponential moving averages of the U closing prices increase Formula (6) which represents the relative strength (RS).

$$RS = \frac{EMA_{ofU}}{EMA_{ofD}} \tag{6}$$

It is converted into an index which can range between 0 and 100 units, calculated according to Formula (7) and called the relative strength index (RSI).

$$RSI = 100 - 100 \times \frac{1}{1 + RS} \tag{7}$$

Generally, when the RSI exceeds the value of 30 units from bottom to top, it is considered a buy signal and when it exceeds the value of 70 points from top to bottom, it is considered a sell signal. In other words, when the RSI has values below 30, the underlying asset based on which the price is calculated is oversold and when it has values over 70, the underlying asset is overbought. For highly volatile markets certain technical analysts recommend the use of the levels of 20 and 80 units instead of 30 and 70 units, as signal levels. Some traders recommend the use of the RSI only for the buy signals in an uptrend market (bull market), or only for the sell signals in a downtrend market (bear market).

The sell and buy signals can also be caused by divergences between the graphs that reflect the evolution of the RSI and that of the data based on which the indicator is calculated. For example, when the RSI graph reaches a local maximum (top) higher than the last and the chart of the share price based on which the RSI is determined reaches a local maximum below the previous one, the indicator provides a buy signal. In the reverse situation, the

indicator provides a sell signal. The signal is even more powerful as the difference between the RSI chart and the data graph based on which the indicator is calculated appears after a period in which the index showed overselling or overbuying.

The RSI average level is of 50 units. Another interpretation of the indicator indicates that when it exceeds this value from bottom to top it indicates the emergence/ continuation of an upward trend (bullish trend), and when it exceeds this value from top to bottom it indicates the emergence/ continuation of a downward trend (bearish trend). This interpretation results from the RSI calculation formula. When it has values over 50, the average gain from the last period is higher than the average loss. In the reverse situation the indicator has values below 50.

The adjusted form of the RSI

The classic form of the RSI only takes into account the price of the underlying asset, without considering the volume of trading that led to that price. Therefore, with this paper we aim to adjust the calculation formula of the index so that the new calculation method takes into account the volume of trading. This is an extremely important indicator because it shows the power that drives the market in one direction or another.

In the formula in question we consider two relative forces: the price, compared to the prices related to a number of previous trading days and the volume of trading expressed in terms of value in relation to the volumes of trading associated with the same number of days. Therefore, in determining the adjusted form of the RSI, the study considers the following ratios:

$$RS_{P/V} = \frac{EMA_{ofU_{P/V}}}{EMA_{ofD_{P/V}}} \tag{8}$$

Where: $RS_{P/V}$ is the relative strength of the price/volume; EMA of $U_{P/V}$ - the exponential moving average of price/volume increase for N days of trading; EMA of $D_{P/V}$ - the exponential moving average of price/volume decrease for N days of trading.

Determining the RSI in our adjusted version (noted RSI_M) involves comparing the relative strength of the volume of trading with the one of the price, according to the following formula (previously used notations are maintained):

$$RSI_M = 100 \times \left(\frac{1}{1 + RS_V} - \frac{1}{1 + RS_P} \right) \tag{9}$$

If the study uses Formula (9), the RSI will have values between -100 and 100 units. In order that the indicator falls within the value limits of 0 and 100 units proposed by Wilder for the classic form of the RSI, the study will use the following adjusted form of Formula (9):

$$RSI_M = 50 \times \left(1 + \frac{1}{1 + RS_V} - \frac{1}{1 + RS_P} \right) \tag{10}$$

By applying Formula (10), the interpretation of the results suggested by Wilder does not change. The buy and sell signal levels recommended differ though from those proposed by Wilder. Thus, for the RSI_M , exceeding the level of 37.5 units from bottom to top signals an increase in the underlying asset's price for the next period, while the exceeding of 62.5 units from top to bottom indicates a price decrease in the near future.

The other interpretations mentioned in the presentation of the classic form of the RSI also remain the same for the proposed form.

The data

In the paper, the study will use the daily closing values of the S&P 500 (standard and poor's 500) index from the period March 01, 2004 to April 30, 2010 and the daily trading volume corresponding to the same period.

S&P 500 is a value weighted index of the share prices of the largest companies traded on the two largest U.S. equity markets, the New York Stock Exchange and NASDAQ, according to their market capitalization. S&P 500 has been published since 1957 and takes account of almost all share prices of the top 500 companies on the U.S. equity market after their market capitalization. Although, the most popular index on the U.S. equity market remains the Dow Jones Industrial Average (DJIA), in this paper we opted for the S&P 500 index, because in our opinion, it succeeds to reflect even better than the DJIA the evolution of the U.S. economy and the expectations related to it. The study believe this happens because the S&P 500 takes account of the share prices of 500 American companies, and the DJIA includes only 30 companies.

As regards the period taken into account, the study tried to capture the last bull market which ended in 2007 together with the emergence of the first news regarding the credit crisis and the transition into a bear market, of which at the time this paper was written (May to August 2010), the study had concrete, but not clear confirmation that it ended. The data included in the design of the study extend therefore, over six years.

The study was aware that the choice of data is extremely important for the credibility of the obtained results. From this point of view, it was known that a period of six years is not nearly extensive enough to generalize the obtained results and to assert that these results are undeniable. As a continuation of the research initiated by this paper, if the indicator constructed in the period under review confirms its ability to give signals to anticipate the future evolution of the market for a sufficient number of cases, the study will extend the analysis for the entire period in which the S&P 500 index was published.

The daily values of the index that was used were adjusted to the effects of dividends and splits. For this reason, the study could make a comparison of the obtained results using the proposed technique with those which an investor would have obtained for the same period by applying the buy and hold strategy, but this is not the objective. The study simply wants to examine whether the putting into practice of the technique is more profitable than using the traditional form of the RSI. In a future research, the study will examine if the use of both forms of the RSI is more profitable than using the buy and hold strategy.

RESULTS AND DISCUSSION

Through this study, it tried to verify, based on the presented empirical data, the accuracy of the RSI signals determined in the classic form and those of the RSI_M at extreme points. The study used as the extreme points (signal values) the levels of 30 and 70 for the classic version of the RSI, respectively the levels of 37.5 and 62.5 for the version of the indicator. For the determination of EMA, the study used the value of N equal to 14 days for both forms of the indicator. In what follows, the study present the two interpretation strategies applied.

The first strategy

The indicator shows a sell signal, regardless of the calculation version, if the RSI closes the day on a level

above the maximum signal value. Selling a unit of the S&P 500 index will take place on the first day the RSI, in any form used, reaches levels below the maximum signal value, provided that these levels are not, on that day, below the average value of the 50 points. In the latter case, the sell signal will not be taken into account. Closing the open position will take place the first day the indicator reaches either the maximum signal value again or a level below 50 points (whichever of the two situations occurs first).

If the RSI closes the day at a level below the minimum signal value, regardless of the used version of calculation, it gives a buy signal. Buying a unit of the S&P 500 index will take place on the first day that the RSI, in any form used, reaches levels above the minimum signal value, provided that these levels are not, on that day, above the average value of the 50 points. In the latter case, the buy signal will not be considered. Closing the open position will occur on the first day the indicator reaches either the minimum signal value again or a level above 50 points (whichever of the two situations occurs first).

By applying the above described strategy for the classic form of the RSI we obtained the results summarized in Table 1.

It was seen from Table 1 that the use of the classic form of the RSI and the putting into practice of the above described strategy has resulted for the analysis period in one hundred and twenty-two buy and sell signals which were not equally distributed, that is, fifty-five buy signals and sixty-seven sell signals, with an overall total loss of 283.89 points. From the buy signals twenty-eight were successful, generating a gain of 594.75 points and an average gain per signal of 21.24 points and the other twenty-seven were losing signals, resulting in a total loss of 867.36 points and an average loss per signal of 32.12 points. All fifty-five buy signals have led to a loss of 272.61 points. Regarding the sell signals thirty-three were successful leading to a total gain of 457.04 points and to an average gain of 13.85 points. The remaining thirty-four sell signals were losing ones, generating a total loss of 468.32 points and an average loss per signal of 13.77 points. All sixty-seven sell signals led to a loss of 11.28 points.

It follows that in the period under review, the number of buy signals that were successful was almost equal to the one of the unsuccessful ones, but the average gain per successful buy signal was much smaller than the average loss per losing buy signal. The recommendation is, when investors use the classic form of the RSI, to follow the buy signals generated by this indicator and to reverse the interpretation of the index by transforming them into sell signals. Using this strategy will change the loss of 272.61 points into a gain of the same value. However, in the study opinion, the sell signals must be ignored because they are neutral, the number and the average gain of the successful ones being almost equal with the number and the average loss of the unsuccessful signals. If both

Table 1. Results obtained by applying the classic form of the RSI.

The classic form of the RSI	Total number of signals	The number of successful signals	The number of losing signals	Gain from successful signals	Gain from losing signals	Total gain
Buy	55	28	27	594.75	-867.36	-272.61
Sell	67	33	34	457.04	-468.32	-11.28
Total	122	61	61	1051.79	-1335.68	-283.89

Source: Calculations by the author.

Table 2. Results obtained by applying the RSI_M.

RSI _M	Total number of signals	The number of successful signals	The number of losing signals	Gain from successful signals	Gain from losing signals	Total gain
Buy	68	31	37	455.38	-709.01	-253.63
Sell	71	29	42	387.31	-511.39	-124.08
Total	139	60	79	842.69	-1220.40	-377.71

Source: Calculations by the author.

the sell and buy signals of the period under review are followed, the total loss of 283.89 points is significant and it can completely transform into gain in the case of totally reversing the interpretation of the index, that is, transforming the buy signals in sell signals and vice versa.

By applying the above presented strategy of trading for the proposed form of the RSI, the study obtained the results summarized in Table 2.

It was seen from Table 2 that by applying the above described strategy and using the RSI_M, for the period under review there were a total of one hundred and thirty-nine buy and sell signals unevenly distributed, respectively sixty-eight buy signals and seventy-one sell signals, with an overall total loss of 377.71 points. From the buy signals, thirty-one were successful, generating a gain of 455.38 points and an average gain per signal of 14.69 points while the other thirty-seven were losing signals, resulting in a total loss of

709.01 points and an average loss per signal of 19.16 points. All sixty-eight buy signals led to a loss of 253.63 points. Regarding the sell signals, twenty-nine were successful leading to a total gain of 387.31 points and an average gain of 13.36 points. The remaining forty-two were losing sell signals generating a total loss of 511.39 points and an average loss per signal of 12.18 points. All seventy-one sell signals led to a loss of 124.08 points.

It follows that in the period under review, both from the buy and the sell signals, the majority were losing ones. The average gain per successful signal was under the average loss per losing signal for the buy signals and vice versa for the sell signals. The overall total loss was significant, with a value of 377.71 points. At first glance, the results obtained by applying the RSI_M led to believe the same thing believed for the classic form, namely that this indicator is unnecessary because,

regardless of its use, it generated loss. The only thing that stopped from asserting this was, as in the situation the study used the classic form of the indicator, the high value of the loss, bigger than the one obtained by using the classic RSI. The study used the same strategy as before to turn the loss into gain: it reversed the interpretation.

Thus, the indicator shows a buy signal when the RSI closes the day on a level above the maximum signal value. Buying a unit of the S&P 500 will take place on the first day when the RSI_M reaches levels below the maximum signal value, provided that these levels are not below the average value of the indicator of 50 points. In the latter case, the buy signal will not be considered. Closing the open position will take place the first day that the indicator will reach either the maximum signal value again or a level below 50 points (whichever of the two situations occurs first).

In the event the RSI_M closes the day at a level

below the minimum signal value, it gives a signal to sell. The sale of a unit of the S&P 500 index will take place on the first day when the RSI, regardless of the used form, reaches levels above the minimum signal value, provided that on that day these levels are not above the average value of the indicator of 50 points. In the latter case, the sell signal will not be considered. Closing the open position will take place on the first day that the indicator will reach either the minimum signal value again or a level above 50 points (whichever of the two situations occurs first).

It is noted that by applying this trading strategy, both the sell and buy signals generate positive results and the total gain of 377.71 points is considerably higher in value than the one reached by applying the same interpretation to the RSI in its classic form.

The second strategy

The indicator shows a sell signal, regardless of the calculation version, if the RSI closes the day on a level above the maximum signal value. Selling a unit of the S&P 500 index will take place on the first day the RSI, in any form used, reaches levels below the maximum signal value. Closing the open position will take place the first day the indicator reaches the minimum signal value.

If the RSI closes the day at a level below the minimum signal value, regardless of the used version of calculation, it gives a buy signal. Buying a unit of the S&P 500 index will take place on the first day that the RSI, in any form used, reaches levels above the minimum signal value. Closing the open position will occur on the first day the indicator reaches the maximum signal value.

By applying the above described strategy for the classic form of the RSI, the study obtained the results summarized in Table 3.

As seen from Table 3 that the use of the classic form of the RSI and the putting into practice of the above described strategy has resulted for the analysis period in thirty-three buy and sell signals which were almost equally distributed, that is, seventeen buy signals and sixteen sell signals, with an overall total loss of 318.32 points. From the buy signals fourteen were successful, generating a gain of 359.78 points and an average gain per signal of 25.7 points and the other three were losing signals, resulting in a total loss of 556.27 points and an average loss per signal of 185.42 points. All seventeen buy signals have led to a loss of 196.49 points. Regarding the sell signals nine were successful leading to a total gain of 322.34 points and to an average gain of 35.82 points. The remaining seven sell signals were losing ones, generating a total loss of 444.17 points and an average loss per signal of 63.45 points. All sixteen sell signals led to a loss of 121.83 points.

It follows that in the period under review, the number of buy signals that were successful was bigger than the

one of the unsuccessful ones, but the average gain per successful buy signal was very small compared to the average loss per losing buy signal. The number of successful and unsuccessful sell signals shows the same situation. The recommendation is, when investors use the classic form of the RSI, to follow the signals generated by this indicator and to reverse the interpretation of the index, that is, to transform the buy signals in sell signals and vice versa.

By applying the above presented strategy of trading for the proposed form of the RSI, the study obtained the results summarized in Table 4.

As seen from Table 4 that by applying the above described strategy and using the RSI_M , for the period under review there were a total of forty-eight buy and sell signals evenly distributed, respectively twenty-four buy signals and twenty-four sell signals, with an overall total loss of 358.67 points. From the buy signals, seventeen were successful, generating a gain of 511.55 points and an average gain per signal of 30.09 points while the other seven were losing signals, resulting in a total loss of 595.5 points and an average loss per signal of 85.07 points. All twenty-four buy signals led to a loss of 83.95 points. Regarding the sell signals, nine were successful leading to a total gain of 228.48 points and an average gain of 25.39 points. The remaining fifteen were losing sell signals generating a total loss of 503.2 points and an average loss per signal of 33.55 points. All twenty-four sell signals led to a loss of 274.72 points.

It follows that in the period under review, the majority from the sell signals were losing ones and the majority of the buy signals were winning ones. The average gain per successful signal was under the average loss per losing signal leading to a loss for both buy and sell signals. The overall total loss was significant, with a value of 358.67 points. The study used the same strategy as before to turn the loss into gain: it reversed the interpretation.

It is noted that by applying this trading strategy, both the sell and buy signals generate positive results and the total gain is higher in value than the one reached by applying the same interpretation to the RSI in its classic form.

Conclusion

In comparison with the classic form of the indicator and for the period taken into account, the RSI version proposed by us generated a higher gain when using a different and even opposite interpretation from the classic one and much greater losses in the reverse situation. Therefore, the study conclude that by analyzing the results of the research, the extreme values of the RSI and RSI_M do not indicate the return of a trend but the continuation of its direction, at least for the short term. So, the classic interpretation is useless while the reversed interpretation gives positive results for both forms of

Table 3. Results obtained by applying the classic form of the RSI.

The classic form of the RSI	Total number of signals	The number of successful signals	The number of losing signals	Gain from successful signals	Gain from losing signals	Total gain
Buy	17	14	3	359.78	-556.27	-196.49
Sell	16	9	7	322.34	-444.17	-121.83
Total	33	23	10	682.12	-1000.44	-318.32

Source: Calculations by the author.

Table 4. Results obtained by applying the RSI_M.

RSI _M	Total number of signals	The number of successful signals	The number of losing signals	Gain from successful signals	Gain from losing signals	Total gain
Buy	24	17	7	511.55	-595.50	-83.95
Sell	24	9	15	228.48	-503.20	-274.72
Total	48	26	22	740.03	-1098.70	-358.67

Source: Calculations by the author.

the indicator. The biggest gains are obtained by using the RSI version proposed by us, regardless of the interpretation strategy used.

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Full Length Research Paper

Age cohort analysis in continued usage intention of mobile value-added services: Generation Y and Baby boomers

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This study aims to investigate the effects of age on continued usage intention of mobile value-added service and its impact on personal innovativeness, perceived usefulness, confirmation and satisfaction between two mobile service user segments; Generation Y and Baby boomers. A multiple group structural equation modeling approach is utilized to assess the proposed model. This study found that personal innovativeness might be an inhibitor for continued use of mobile value-added services for the Baby boomers. Confirmation may be a critical motivator for Baby boomers' continued use of mobile value-added services. Our findings provide mobile value-added providers with insights into their advertising strategy. According to these findings, mobile value-added service providers are recommended to appeal to the emotional value of innovativeness for Generation Y. For Baby boomers, emphasis can be placed on the economic value obtained from their services.

Key words: Expectation confirmation model, mobile value-added service, continuance.

INTRODUCTION

Due to the rapid development of wireless Internet and mobile telecommunications technologies, mobile commerce has increased in social prominence. As the number of users increases, price rates for traditional voice services decrease. The average revenue per user (ARPU) has gradually dwindled, weakening telecommunications firm profits. These trends indicate that leaving revenue dependent on traditional voice services will be a poor business model in the future. In response, mobile value-added services have been introduced. Mobile value-added services are unlimited by time or space and include mobile Internet, navigation, ringtones, downloads, and mobile gaming. Such services have become the darlings of the market and a significant driver of revenue, giving telecommunications operators an opportunity to build new revenue models.

As telecommunications operators introduce diverse

mobile value-added services to attract new users or keep current users, the key to reversing the decline in ARPU lies in the willingness of consumers to continue using these services. ARPU increases only if consumers intend to continue using mobile value-added services. As such, a thorough understanding of the continued usage behavior of consumers in regards to mobile value-added services should greatly facilitate development of the mobile device industry (Green et al., 2001; Matskin and Tveit, 2001; Nohria and Vrechopoulos et al., 2003).

In recent years, studies related to mobile value-added services have gained increased attention. Researchers have eagerly entered the arena, conducting research from the angles of relevant performance, value chains, marketing, technology acceptance, and confirmation of buyer expectations. Each research outcome has its strong points and contributes to the market of mobile value-added services and the telecommunications industry (Balasubramanian et al., 2002; Barnes, 2002; Buellingen and Woerter, 2004; Fang et al., 2005; Lin and Wang, 2006; Okazaki, 2006; Ratliff, 2002; Wu and Wang, 2005; Kumar and Lim 2008; Yang and Folly, 2008).

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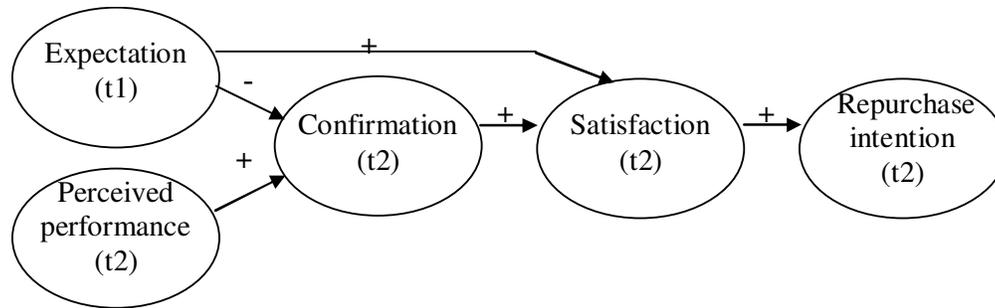


Figure 1. Expectation-confirmation theory (Oliver, 1980).

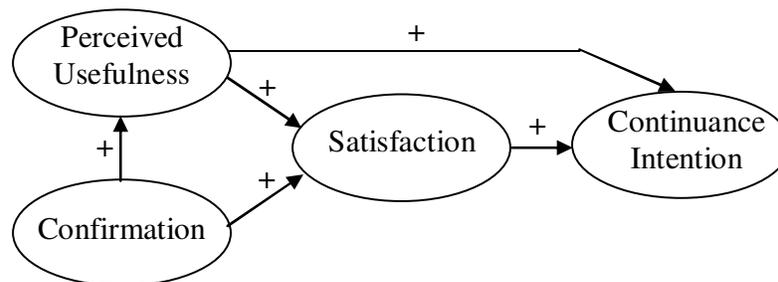


Figure 2. Expectation confirmation model (Bhattacharjee, 2001).

This study differs from previous research in that it combines the expectation confirmation model (ECM) and personal innovativeness to examine the continued usage behavior of consumers in regards to mobile value-added services. This study explores the influence of age group differences on continued individual usage of mobile value-added services, and illuminates the consumer psychology of the topic. These research results provide a reference to mobile telecommunication service providers and future researchers in relevant fields.

LITERATURE REVIEW

In consumer behavior literature, expectation-confirmation theory (ECT) has been broadly applied to explain and predict the post-purchase behavior of consumers. Oliver (1980) suggested that consumers have expectations regarding a specific product or service prior to purchase and that these expectations play a part in the formation of intentions to continue purchases (Figure 1). After accepting the product or service, consumers compare the perceived performance of the product or service with their previous expectations to determine the degree to which their expectations have been met (confirmation). Pre-purchase expectations and post-purchase confirmation determine the level of customer satisfaction. Highly satisfied consumers continue purchasing the product or

service, while dissatisfied customers discontinue purchases.

Bhattacharjee (2001) used Oliver's (1980) ECT and Davis' (1989) technology acceptance model (TAM) as a basis for developing an ECM suitable for explaining and predicting usage behavior in information systems. Bhattacharjee (2001) suggested that continued usage is determined by the following three variables: (1) the user's post-usage satisfaction; (2) the degree to which the expectations of the user are confirmed; (3) the user's post-usage expectations. These variables are expressed in the formation of perceived usefulness as shown in Figure 2.

Bhattacharjee's (2001) unique viewpoint suggested conversion of all latent variables in the original ECT to post-usage concepts, emphasizing post-usage expectations rather than pre-usage expectations. Since expectations regarding specific products or services change with time, particularly the usage behavior of consumers in regards to information systems, the subject must be examined from a post-usage perspective. ECT defines expectations as 'individual cognitive beliefs' or 'the sum of cognitive beliefs'. This definition is consistent with TAM, which defines usage behavior in information systems as cognitive beliefs. Relevant studies based on TAM (Davis, 1989; Karahanna et al., 1999) produced evidence in support of the perspective that "perceived usefulness (PU) is sufficient to represent the meaning covered by post-usage expectations." In short, ECM uses perceived usefulness as a proxy variable for measuring

post-usage expectations. Secondly, ECM assumes that the meaning of the pre-consumption variable (t1) is included in the post-consumption (t2) variable, meaning that the influence of perceived performance (t2) and expectation (t1) is included in the constructs of satisfaction and confirmation. As such, these elements are not used independently as single latent variables.

In addition, Bhattacharjee (2001) analyzed and compared the similarities and differences between ECM and TAM. The two similarities: (1) Both approaches used cognitive beliefs to predict continued usage behavior for information systems; (2) both adhered to the “cognitive belief-emotion-intention” causal relationship. The three differences: (1) TAM emphasized a user’s initial acceptance and usage of a system, while ECM emphasized later usage behavior; (2) perceived usefulness and perceived ease of use were pre-usage concepts in TAM but post-usage variables in ECM. As such, ECM could have superior predictive power in explaining usage behavior following system acceptance. (3) Through the various explanatory powers of confirmation and satisfaction in regards to continued usage tendencies, ECM explained how users might decide to stop using a system even after positive cognitive beliefs have facilitated a possible re-usage tendency.

In examining the utilization of new technologies, researchers found that innovative characteristics had an important influence on consumer attitudes. Typically speaking, innovation refers to individual perception of new ideas or technologies. Mobile value-added services have a broad range of application and involve new concepts, technologies, and usage habits. As a result, this study suggests that mobile value-added services are consistent with innovation, no matter what angle such services are viewed from, and could be seen as innovative services to a certain extent. This premise validates the introduction of personal innovativeness in this study. Agarwal and Prasad (1998) defined personal innovativeness (PI) as the willingness of individuals to experience new technology.

In light of individual differences, specific individual differences in stable environments represent the consistency and stability of individuals in regards to specific targets (example, the use of new information technologies). These characteristics affect individual attitudes and behaviors. The most representative element of individual differences in stable environments is personal innovativeness, which is highly related to individual risk tolerance. If individuals are willing to accept risk, then they are typically more willing to participate in innovative activities (Agarwal and Prasad, 1998).

In empirical studies, Schillewaert et al. (2005) found that innovation-oriented sales staffs are more accustomed to and capable of using computer technology and realizing the usefulness of such systems to sales projects. A direct relationship exists between the personal innovativeness of sales staff and the use of SFA systems. Thompson et al. (2006) researched future student

willingness to accept Microsoft Access software, and demonstrated that higher personal innovativeness was associated with higher perceived usefulness and usage intentions.

Age is a widely used demographic variable to characterize the adoption of technologies between two or more consumer groups (Kumar and Lim, 2008; Yang and Folly, 2008). This study explores the difference in mobile value-add service usage between two particular generations of consumers; Generation Y and the baby boom. These two generations are prominent users of mobile value-add services behavior because of their inherent motivational needs (Kumar and Lim, 2008; Yang and Folly, 2008). A comparison of satisfaction and continuance intention determinants of mobile value-added services between these two groups is expected to offer insights in effective targeting to mobile value-add service providers.

Generation Y was born between 1980 and 1994, 30 and 16 years old respectively as at 2010. Generation Y is an important consumer segment and claim nearly 5 million people in Taiwan that have significant spending power. Generation Y is important for marketers because the impact that they have on their families’ purchasing decisions (Renn and Arnold, 2003). Generation Y often adopt new technologies early, use the internet extensively, and use mobile value-add service substantially.

Baby boomers were born between 1946 and 1964, 64 and 46 years old respectively as at 2010. There are more than 6 million Baby boomers in Taiwan and average the highest disposable income. Despite different lifestyles and spending habits from Generation Y, Baby boomers are an important consumer group for mobile carriers.

This study proposes that differences in mobile services usage between Generation Y and Baby boomers may be caused by motivational differences. Thus, the following will be significantly different between the two age cohorts (Figure 3):

- H₁: The effect of satisfaction on continuance intention
- H₂: The effect of confirmation on satisfaction
- H₃: The effect of perceived usefulness on satisfaction
- H₄: The effect of confirmation on perceived usefulness
- H₅: The effect of perceived usefulness on continuance intention
- H₆: The effect of personal innovativeness on continuance intention
- H₇: The effect of personal innovativeness on perceived usefulness

METHODOLOGY

A sample of 500 mobile services users were drawn from a purchased consumer panel to participate in an online survey. Two age cohorts were identified, Generation Y (born from 1980 to 1994) and Baby boomers (born from 1946 to 1964). Of the 500 sampled, 389 completed the online survey. A sample of 272 Generation Y and 117 Baby boomers was used for analysis.

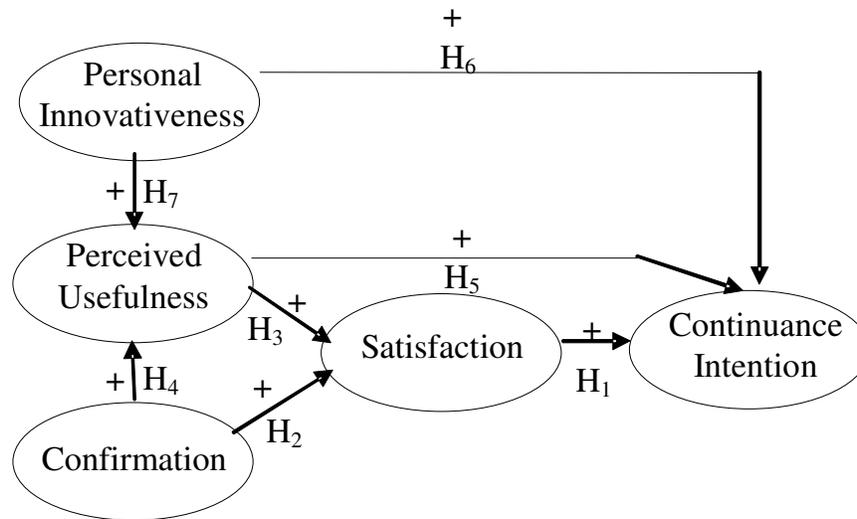


Figure 3. Research model.

Multi-item scales from previous research were adapted to measure each of the variables in the research model. Four items measuring personal innovativeness, three items measuring confirmation, three items measuring perceived usefulness, three items measuring satisfaction and three items measuring continuance intention were adapted from a prior study of expectation confirmation theory and social cognitive theory (Agarwal and Prasad, 1998; Agarwal and Karahanna, 2000; Bailey and Person, 1983; Bhattacharjee, 2001; Davis, 1989; McKinney et al., 2002) as given in Table 1.

All scale items used a seven-point Likert scale, strongly disagree (1) to strongly agree (7), and were modified for a mobile value-added services context. The scale exhibited high internal consistency in previous research. A pre-test was conducted and a final instrument was revised based on the pre-test input. A two-step structural equation modeling was used for testing the research model using Amos 16.

RESULTS

Measurement model evaluation

To assess the final measurement model, this study examined the reliability, convergent validity, and discriminant validity of the constructs (Table 2). Cronbach's alpha for each latent construct ranged from 0.70 to 0.86 across groups and proved to have good internal consistency. Convergent validity was assessed by the magnitude of the factor loadings of each indicator of the latent constructs (Anderson and Gerbing, 1988). Every item loaded significantly on the construct at the p -value < 0.05 . The average of the standardized factor loading was 0.70 and 0.93 in the Generation Y and Baby boomers, respectively. In addition, the composite reliabilities (CR) of each construct in this study ranged from 0.85 to 0.95. Average variance extracted (AVE) was calculated to assess discriminant validity and ranged from 0.61 to 0.83 across

groups. All scales met the requirements for testing the measurement model.

The assessment of the measurement model used confirmatory factor analysis (CFA). The overall fit was $\chi^2/d.f. = 2.97$, GFI = 0.91, CFI = 0.91, NFI = 0.92, RMSEA = 0.069, GFI, NFI, and CFI exceeded the recommended 0.90 threshold levels (Bollen, 1989; Hair et al., 2005). In addition, RMSEA was lower than 0.08 as recommended by Hair et al. (2005).

Hypotheses testing and structural equation model evaluation

The testing of the hypothesized model used structural equation modeling and the fit statistics of the structural multi-group model showed a good fit ($\chi^2/d.f. = 2.48$, GFI = 0.92, CFI = 0.92, NFI = 0.93, RMSEA = 0.073). Table 3 shows the results of hypotheses testing. Further, Figures 4 and 5 provide each age cohort's structural equation model.

This study divided the returned samples into Generation Y ($n_1=272$) and Baby boomers ($n_2=117$) to examine whether age has any significant difference towards the path relation of the model. First, researchers conducted two rounds of SEM structural model analysis to obtain the path coefficient (regression coefficient) of each group. Then, the differences between two standardized regression coefficients (β) were substituted into the following t-test formula (Cohen and Cohen, 1983, p.55-56):

$$t = \frac{\beta_1 - \beta_2}{\sqrt{\frac{\sum (Y_1 - \hat{Y}_1)^2 + \sum (Y_2 - \hat{Y}_2)^2}{n_1 + n_2 - 4} \times \frac{\sum X_1^2 + \sum X_2^2}{\sum X_1^2 \times \sum X_2^2}}}$$

Table 1. Items and references.

Construct	Item	Reference
Personal Innovativeness	PI1: If I heard about a new technology, I would look for ways to experiment with it.	Agarwal and Prasad (1998); Agarwal and Karahanna (2000)
	PI2: In general, I am hesitant to try out new technologies	
	PI3: Among my peers, I am usually the first to try out new information technologies.	
	PI4: I like to experiment with new information technologies	
Confirmation	C1: My experience with using mobile value-added services was better than what I expected.	Bailey and Person (1983); Bhattacharjee (2001); McKinney et al. (2002)
	C2: The service level provided by mobile value-added services was better than what I expected.	
	C3: Overall, most of my expectations from using mobile value-added services were confirmed.	
Perceived Usefulness	PU1: Using mobile value-added services makes me save time	Davis (1989); Bhattacharjee (2001)
	PU2: Using mobile value-added services improves my efficiency	
	PU3: Mobile value-added services are useful to me	
Satisfaction (S)	S1: How do you feel about your overall experience of mobile value-added services use: Very dissatisfied/Very satisfied.	Bhattacharjee (2001)
	S2: How do you feel about your overall experience of mobile value-added services use: Very displeased/Very pleased.	
	S3: How do you feel about your overall experience of mobile value-added services use: Very frustrated/Very contented.	
Continuance Intention (CI)	CI1: I intend to continue using mobile value-added services rather than discontinue its use.	Bhattacharjee (2001)
	CI2: My intentions are to continue using mobile value-added services than use any alternative means (traditional telephone voice services).	
	CI3: If I could, I would like to discontinue my use of mobile value-added services (reverse coded).	

The study used the t-test to find whether the effect of echo construct on the model differs between the age cohorts. Table 3 indicates that age differences would significantly influence the path relations of the (1) confirmation → satisfaction; (2) confirmation → perceived usefulness; (3) personal innovativeness → continuance intention; (4) personal innovativeness → perceived usefulness.

DISCUSSION AND IMPLICATIONS

In the extended ECM, four constructs— personal innovativeness, perceived usefulness, confirmation, and satisfaction— were employed to explore whether

significant differences exist between two age cohorts regarding continuance intention to use mobile value-added services. This study assumed Baby boomers perceive mobile value-added services as more difficult to use than Generation Y since Baby boomers have had less personal innovativeness to the technology environment than Generation Y. The study found that low personal innovativeness lead to lower perceived usefulness and continuance intention to use mobile value-added services. Thus, personal innovativeness may be an inhibitor to continued use mobile value-added services for the Baby boomers.

The findings provide insights to mobile value-added service providers regarding the difference in the effect of confirmation on satisfaction and perceived usefulness

Table 2. Measurement model results.

Construct	Item	Overall model (n = 389)				Generation Y (n ₁ = 272)				Baby boomers (n ₂ = 117)			
		Factor loadings	CR	AVE	α	Factor loadings	CR	AVE	α	Factor loadings	CR	AVE	α
PI	PI1	0.80				0.89				0.73			
	PI2	0.86				0.93				0.72			
	PI3	0.71	0.90	0.70	0.72	0.81	0.95	0.82	0.71	0.70	0.86	0.61	0.70
	PI4	0.79				0.87				0.71			
C	C1	0.78				0.79				0.77			
	C2	0.88	0.86	0.68	0.75	0.89	0.88	0.70	0.74	0.87	0.86	0.68	0.72
	C3	0.82				0.83				0.81			
PU	PU1	0.84				0.86				0.82			
	PU2	0.83	0.86	0.67	0.77	0.85	0.86	0.68	0.82	0.81	0.85	0.65	0.73
	PU3	0.78				0.79				0.77			
S	S1	0.80				0.84				0.75			
	S2	0.77	0.89	0.73	0.79	0.80	0.91	0.78	0.84	0.74	0.85	0.65	0.76
	S3	0.81				0.85				0.77			
CI	CI1	0.79				0.84				0.74			
	CI2	0.86	0.92	0.80	0.84	0.89	0.94	0.83	0.86	0.83	0.90	0.74	0.82
	CI3	0.88				0.90				0.86			

Composite reliability (CR); Average variance extracted (AVE); Cronbach's alpha.

Table 3. Results of hypotheses testing.

Hypothesis	Generation Y (n ₁ = 272)	Baby boomers (n ₂ = 117)	Difference
Path	β ₁ Coefficients (t-value)	β ₂ Coefficient (t-value)	β ₁ -β ₂ (t-value)
H ₁ : Satisfaction → Continuance Intention	0.73***(9.85)	0.75***(9.33)	-0.02(-1.32)
H ₂ : Confirmation → Satisfaction	0.32**(4.05)	0.47***(3.98)	-0.15***(3.41)
H ₃ : Perceived Usefulness → Satisfaction	0.65***(9.95)	0.61***(8.61)	0.04(1.53)
H ₄ : Confirmation → Perceived Usefulness	0.38***(3.65)	-0.43***(2.79)	-0.05*(1.87)
H ₅ : Perceived Usefulness → Continuance Intention	0.61***(10.31)	0.59***(9.37)	0.02(1.38)
H ₆ : Personal Innovativeness → Continuance Intention	0.11**(2.34)	0.05(1.16)	0.06***(2.63)
H ₇ : Personal Innovativeness → Perceived Usefulness	0.15**(2.25)	0.10*(1.67)	0.05*(1.95)

*p>0.1; **p>0.05, ***p>0.01.

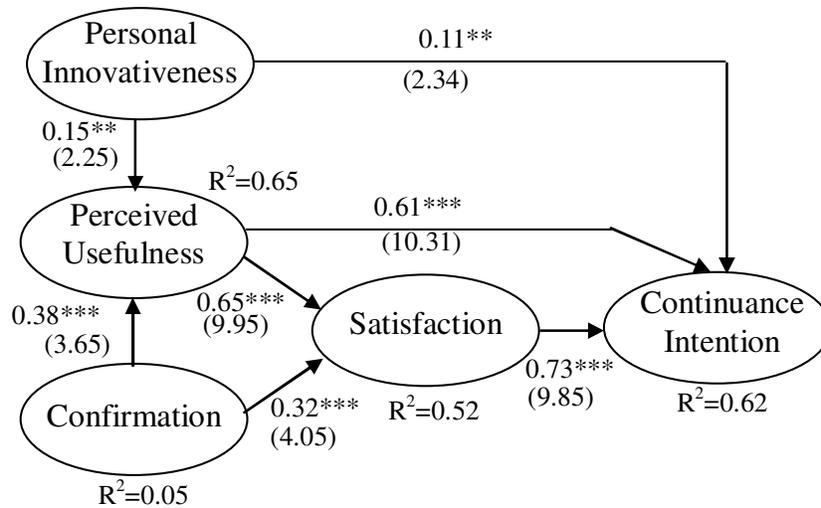


Figure 4. Structural model for Generation Y
*p>0.1, **p>0.05, ***p>0.01.

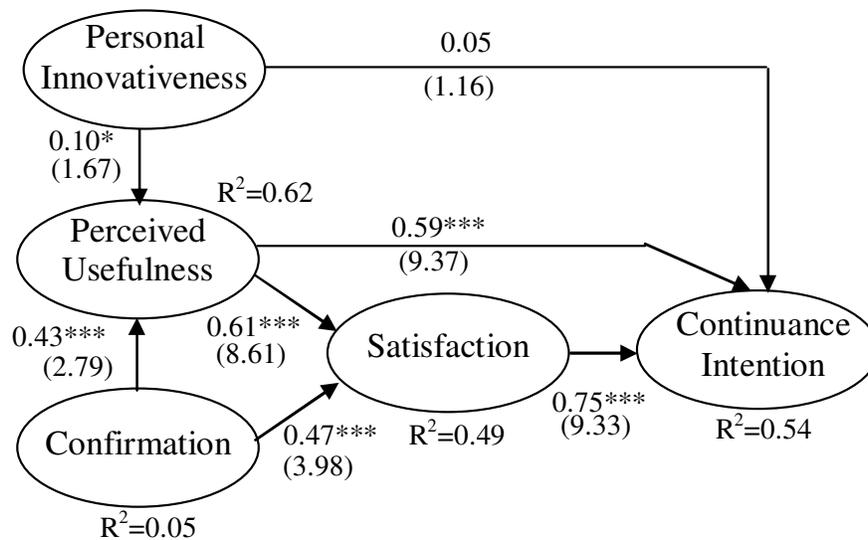


Figure 5. Structural model for Baby boomers.
*p>0.1, **p>0.05, ***p>0.01.

between Generation Y and Baby boomers. The results show that confirmation is an important construct of the extended ECM for Generation Y and Baby boomers. Thus, mobile value-added service providers need to monitor their efforts to improve the factors of confirmation.

Our findings provide mobile value-added providers with insights into their advertising strategy. Accordingly, it is recommended to mobile value-added service providers to appeal to the emotional value of innovativeness for Generation Y. For Baby boomers, emphasis is placed on

economic value of confirmation from their services.

LIMITATIONS AND FUTURE RESEARCH

Despite obstacles during the research process, this study tried to increase the research reliability and effectiveness. However, with limited labor and resources, certain research limitations still existed. Suggestions for further researcher are: (1) this study used a possibly over-simplified snapshot (cross-section) method to understand

the inter-relationships of each construct in the model. Rationally, there should be reinforcements through vertical-section proofs, (2) the sample was purposive and convenience-based, so the results may not be generalized to broader populations, (3) this study examined two specific age cohorts, Generation Y and Baby boomers; therefore, the results may not apply to other age cohorts, and (4) future researchers may consider other demographic variables-gender, income, and education-as a demarcation variable to understand continued usage intention toward mobile value-added service providers.

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Full Length Research Paper

How does trade-mediated technology transfer affect interregional and intersectoral competition? Exploring multi-sectoral effects in a global trade model

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In this paper, all technology transfers are embodied in trade flows within a three-region, six-traded-commodity version of the GTAP model. 4% Hicks-Neutral technical progress in heavy manufacturing in one region has uneven impacts on productivity elsewhere. Why? Destination regions' ability to harness new technology depends on their absorptive capacity and on the structural congruence of the source and destination. Together with trade volume, these two factors determine the recipient's success in capturing foreign technology. Sectors, intensive in heavy manufacturing, register higher productivity growth. Inter-regional competition coupled with changes in price relativities, loom large in general equilibrium adjustment. Hicks-neutrality of the TFP (total factor productivity) improvement implies that, at the initial configuration of inputs, the marginal products of land, labour, and capital, change by the same proportion in any region. However, for the experiment conducted, productivity changes and the spillover coefficients dominate the variable impact across sectors and regions.

Key words: Absorptive capacity, capture parameter, trade, technology, Armington, TFP (total factor productivity).

INTRODUCTION

The paper models multi-sectoral issues involved in embodied technology spillover. This entailed necessary modifications in the global trade model - global trade analysis project's (GTAP) to incorporate technology spillover equation. For implementation, the study aggregates the 30 regions \times 37 traded-sectors version 4 of the GTAP database into six traded sectors and three regions (Hertel, 1997). To understand the channel of spillover, the study uses a lower dimensional database of the large-scale non-linear model to focus on the principal pathways of transmitted benefits. The choice of sectoral aggregation is based on the sectors' technology-intensiveness. Since the purpose is to illustrate the role of the capture parameter in absorbing transmitted technology and ensuing changes in regional trade competition, the low regional dimensionality of the model does not undermine the primary focus of the article. Also, current versions of GTAP Database (Version 7 to date) extend the regional and sectoral coverage while basic underlying theory re-mains unaltered. Given the primary focus of the analysis, it does not undermine the purpose in hand.

Aggregation of sectors

In this implementation, the sectors are defined within broad categories because of shared characteristics. High-technology products such as heavy manufacturing are assumed to be the primary vehicles for embodied technology flows. In Table 1, the study maps these broad categories with the GTAP sectoral classification Version 1 (GSC1) industries in Version 3 of the GTAP database. However, the study aggregates the database into three regions, which are, USA, EU and Rest-of-the-World (ROW) aggregation being governed by clustering the component regions/countries as per their level of GDP and development, in keeping with the existing empirical evidences.

The aggregated database is produced by using GTAP's aggregation programme on the 37 \times 30 trade, production and input-output data in version 3 of the GTAP database. This produced the aggregated database comprising the files for base case data, sets and parameters. The study refers to this three-region, six-traded-commodity model, as GTAP 3 \times 6.

Table 1. Concordance of GTAP version 3 Sectors with current implementation.

GTAP version 3 sectors	GSC1 Identifier	Mapped sector
Paddy rice	pdr	
Wheat	wht	
Grains	gro	
Non grain crops	ngc	
Wool	wol	
Other livestock	olp	PrimaryInds (Primary Industries)
Forestry	for	
Fisheries	fish	
Coal	col	
Oil	oil	
Gas	gas	
Other minerals	omn	
Processed rice	pcr	
Meat products	met	
Milk products	mil	FoodProds (Food Products)
Other food products	ofp	
BEVERAGES and tobacco	b_t	
Textiles	tex	
Wearing apparels	wap	
Leather etc	lea	
Lumber	lum	Textl_LMfg (Textiles and Light Manufacturing)
Non-metallic minerals	nmm	
Fabricated metal products	fmp	
Other manufacturing	omf	
Pulp paper etc	ppp	
Petroleum and coal	p_c	
Chemicals rubbers and plastics	crp	
Primary ferrous metals	i_s	HeavyManuf (Heavy Manufacturing)
Nonferrous metals	nfm	
Transport industries	trn	
Machinery and equipment	ome	
Electricity water and gas	egw	
Construction	cns	
Trade and transport	t_t	Services
Other services (private)	osp	
Other services (govt)	osg	
Ownership of dwellings	dwe	Dwellings

A MECHANISM FOR TRADE-MEDIATED TECHNOLOGY DIFFUSION

Technology transmission equations

Technology embodied in traded and domestic intermediate inputs spills over to all other sectors in the source region as well as all sectors in the client regions, and affects their output via induced productivity escalation (Alam, 2009a,b). Following an exogenous

technological improvement in one sector of source, all other sectors in the source region, and all sectors in client regions experience endogenous improvement in total factor productivity (TFP). Thus, international trade in commodities entails trans-border flows of superior 'technologies' embodied in those traded goods and services (Connolly, 1997; Coe et al., 1995, 1997, 2008; Nelson, 1990; World Development Report World Bank, 1999; Kosempel, 2007; Talebi and Tajeddin 2011; Cunha and Heckman, 2007). The effects of absorptive capacity (AC) and structural similarity (SS) in

harnessing trade-embodied technologies are considered. Recently, Cunha and Heckman (2008) discussed the role of diverse abilities of people in facilitating productivity of investment in technological knowledge. The study argues that domestic country's ability to use the foreign technology depends on the recipient's capacity to identify, procure, and use the diffused state-of-the-art (that is, on AC). SS relates to the similarity of factor proportions in the source and destination countries. The degree to which new technology can be absorbed by the destinations depends on the differentials in embodied spillover (depending on AC and SS) which characterizes the extent to which the new foreign improvement in technology is captured locally (Cohen and Levinthal, 1989, 1990; Keller, 1999, 2001; van Meijl and van Tongeren, 1998; Das and Powell, 2001; Das, 2002; Adebayo, 2010; Yew et al., 2011). For the current implementation, the paper considers trade-induced spillover between client regions and the source of innovation, and endogenous domestic spillover to the sectors in the source itself. In case of multi-sectoral analysis, the amount of trade-induced knowledge spillover from a source sector in the donor region to a particular sector via traded intermediates depends on source and using sector-specific trade-embodiment index. Let index $[E_{ijrs}]$ be the flow of imported inter-mediate produced in sector 'i' in source region 'r' that is exported to firms in sector 'j' in recipient region 's' $[F_{irjs}]$ per unit of composite intermediate input of 'i' used by sector 'j' in destination 's' $[M_{ijs}]$. The latter - M_{ijs} - is domestically sourced as well as composite imported inputs usage of intermediate input 'i' by sector 'j' in region 's'. Thus:

$$E_{irjs} = F_{irjs}/M_{ijs} \quad (1)$$

Where, F_{irjs} is the imports of 'i' from source 'r' used by sector 'j' in recipient 's'. In GTAP notation, M_{ijs} is the value of purchases of tradable intermediate i by firms in industry j of region r. Now, trade intensity is treated as a binary variable, indexed both for the recipient sector 'j' in a given region 's' and for the source sector 'i' and region 'r' of the intermediate inputs. The GTAP database is needed to be adjusted to incorporate this degree of disaggregation, to derive the regional composition of imports for individual using sectors in s, the study makes a pro-rata assumption based on import proportionality--that is, the share of imported input 'i' from source 'r' in receiving region 's' holds for all industries in 's' using imported 'i'. Thus, if F_{irjs} indicates usage in region s by industry j of imported intermediate i from source r, we assume that:

$$F_{irjs}/F_{ijrs} = F_{irrs}/F_{irrs} \quad (2)$$

where F_{irrs} is the aggregate imports of tradable commodity 'i' in region 's' from all source regions. The left-hand ratio in (2) is the quantity share of source r in the imports of i by sector j in its total imports of i. The right-hand ratio in (2) is the market share of source 'r' in the aggregate imports of tradable 'i' in region 's' at market prices.

In the source region, the technological change arising exogenously in a particular sector, directly spills over to the other sectors via the locally produced material inputs embodying advanced technology and indirectly via the relative price changes in imported intermediates. The latest state-of-the-art technology embodied in the intermediate inputs experiencing technological progress diffuses to other sectors using that material input/s sourced domestically. Hence, the exogenous TFP improvement in the region of origin, endogenises the TFP improvement via a domestic spillover effect so that the relevant sectoral embodiment index $[E_{ijr}]$ for the sectors in the source region of innovation is written as:

$$E_{ijr} = D_{ijr}/M_{ijr} \quad (i \neq j) \quad (3)$$

Where, D_{ijr} is the quantity of domestic tradable commodity 'i' used by firms in sector 'j' of source region 'r' and M_{ijr} is composite

intermediate inputs of 'i' (from all sources) used by sector 'j' in 'r'. In GTAP notation, D_{ijr} is VDFA (i, j, r) that is, the value of purchases of domestically supplied intermediate i by sector j in region r. In fact, the right-hand ratio is the domestic input-output coefficient from the source sector 'i' to the recipient sector 'j' in 'r'. For the source country, the technology capture parameter is defined in terms of the human capital-induced absorption capacity (AC) only. Thus, the higher AC in 'r', presumably, will induce a higher domestic trade-mediated transmission such that the spillover coefficient is:

$$\gamma_{ijr}(E_{ijr}, \theta_r) = E_{ijr}^{1-\alpha_r} \quad (4)$$

Where, $\alpha_r \in [0, 1]$ is the human capital [HK] induced capture-parameter for source 'r'. It is to be noted that the definition for the spillover coefficient for all other regions is:

$$\gamma_{ijrs}(E_{ijrs}, \theta_s) = E_{ijrs}^{1-\theta_s} \quad (5)$$

Where γ_{ijrs} is the spillover coefficient between 'i' in source 'r' and 'j' in destination 's' and θ_s is the product of human capital [HK] and structural similarity [SS]. $\gamma_{ijr}(\bullet)$ is a convex function of α_r and strictly concave function of E_{ijr} .

The productivity transmission equation for the client regions can be written as:

$$ava(j, s) = E_{ijrs}^{1-\theta_s} \cdot ava(i, r) \quad (6)$$

Where, $ava(i, r)$ and $ava(j, s)$ are respectively the percentage changes in TFP levels (HNTP parameters, AVA) in source and destinations $[i \neq j, r \neq s]$. For the source region, the transmission equation is given by:

$$ava(j, r) = E_{ijr}^{1-\alpha_r} \cdot ava(i, r) \quad (7)$$

Where, i and j ($i \neq j$) are the innovating sector and the receiving sectors in the source 'r'.

Simulation design, quantitative evidence and GTAP implementation

There are several empirical studies estimating TFP indexes across regions. Very few provide industry specific TFP indexes. To the best of my knowledge, amongst the recent studies, only Keller (1997, 1999) calculated a TFP index by industry for 8 OECD countries. The study reproduces the figures in Table 2 and match with the GSC1.

It is evident that the industries included in the heavy manufacturing and textiles and light manufacturing clusters, experienced higher average annual TFP growth. Since the heavy manufacturing sector includes the goods with the relatively most rapid rates of technological improvement, the study considers heavy manufacturing in USA as the source sector for technological progress; the Hicks-neutral technological coefficient was shocked there by 4% so that $ava(i, r) = 4$. In the real world, there exist particular patterns of technology diffusion between the source and the recipient sectors. In the model, the study attributes these patterns to the differing intensities with which sectors use imported material inputs originating in the source and contrast the differences between impacts on the user sectors. In the current experiment, the study considers one unique source sector of innovation "i". The source region 'r' is also unique. The economic model includes additional equations appended to the standard GTAP model (Hertel, 1997),

Table 2. Total factor productivity index [Average Annual Growth 1970-91 (%)] by industry for 8 OECD countries.

ISIC code (Rev. 2)	Name	GSC1 mapping (Rev. 3)	Mapped sectors GTAP Version 3	Average growth rate	Arithmetic average
31	Food, Beverages, and Tobacco	OFD, B_T	Food Products	1	
32	Textiles, Apparel and Leather	TEX, WAP, LEA	Textiles and light manufacturing	2.3	1.65
33	Wood Products and Furniture	LUM/OMF	Textiles and light manufacturing	2	
34	Paper, Paper products and printing	PPP/OMF	Heavy manufacturing	1.7	
351/2	Chemicals and Drugs	CRP	Heavy manufacturing	3.8	
353/4	Petroleum refineries and products	P_C	Heavy manufacturing	4.3	
355/6	Rubber and plastic products	CRP	Heavy manufacturing	2.5	2.83
36	Non-metallic mineral products	NMM	Textiles and light manufacturing	2.5	
37	Basic metal industries	NFM	Heavy manufacturing	3	
381	Metal products	FMP	Textiles and light manufacturing	1.9	1.9
382/5	Non-electric machinery, OCA, professional goods	OME	Heavy manufacturing	4.3	
383	Electrical machines and communication equipment	OME	Heavy manufacturing	4.6	4.45
384	Transportation equipment	TRN	Heavy manufacturing	3.2	3.2

Source: Table A.1, Keller (February 1997), NBER WP # 6113 and Keller (March 1999), NBER WP # 6990.

some additional coefficients and additional parameters for AC and SS of region 'r'. The study assumes that USA is the source of technological invention, although other countries do perform, but not so rapidly as North America. For the absorption capacity parameter for USA [AC_{USA}], a high value for α_r proxying AC_{USA} is assigned in keeping with the presumption. The rationale being: USA and EU are more similar in terms of their human capital endowment than Rest-of-the-world (ROW) such that $AC_{USA} > AC_{EU} > AC_{ROW}$. 'ROW' consists typically of the less developed or dynamic developing economies - laggard compared to the US and EU.

ANALYSIS OF SIMULATION RESULTS

Differential macroeconomic effects across regions

Table 3 summarizes the differential regional impacts of such a shock. Note that the aggregative TFP index in any region is a sectoral value-added share-weighted sum of each sector's TFP improvements. The endogenous

technical change in a sector, in turn, depends crucially on the input-specific trade intensity of a sector. However, the extent and magnitude of inter-sectoral technology diffusion and the concomitant rise in the sectoral TFP index depends also on the magnitudes of the embodiment index and the spillover coefficient, and of the region-wide capture-parameter. USA, being the source of innovation, experiences the highest overall technological progress. More importantly, amongst the two recipients, the EU receives higher doses of technology transmission than ROW. Economy-wide indexes of spillover coefficients are constructed (Table 4) to simplify discussion of the role of the region-wide capture parameter. From Table 4, it is evident that the aggregate embodiment index in USA [E_{ir}] is higher than those in the destinations [E_{irs} ($s \neq r$)] and since the capture-parameter(θ_r) in USA is higher than θ_s in both EU and ROW, it is clear that USA harnesses the maximum spillover (γ_{ir}).

Table 3. Simulated macroeconomic effects of technological change across regions[#]

Percentage change	USA	EU	ROW
1. Region-wide index of TFPgrowth [Tec_Chg (r)]	3.98	2.30	0.05
2. Nominal GDP at Factor Cost [NA_gdpfc]	3.24	1.92	0.44
3. Real GDP from Income side [NA_realgdpinc] (market prices)	3.97	2.28	0.07
4. Real GDP from Expenditure side [qgdp] (at market prices)	3.97	2.28	0.07
5. Price index of GDP from Expenditure side [pgdp] (market prices)	-0.70	-0.36	+0.37
6. Change in Trade Balance [DTBAL] ^{1y}	+7301.1	+7176.2	-14477.3
7. McDougal Terms-of-trade [tot]	-0.76	-0.44	+0.39
8. Price index for GNE [NA_prigne]	-0.62	-0.31	+0.29
9. Real Gross National Expenditure [NA_realgne]	3.75	2.12	0.29
10. Region-wide index of Real Value-added [qva_agg] (in conventional units) ^b	0.00	0.00	0.00
11. Region-wide Price index of Value-added [pva_agg] (in conventional units) ^c	3.24	1.92	0.44
12. Region-wide index of Real Value-added (in constant efficiency units) ^b	3.98	2.30	0.05
13. Real value of exports [qxwreg]	3.84	2.50	-0.18

[#] These values are for percentage changes of level variables from their control values (post-shock).

Table 4. Values of economy-wide spillover coefficients and capture-parameters. Source: Author's calculation

GTAP region (1)	Spillover coefficient (γ_{irs}) (2)	Capture-parameter(θ_r) (3)
EU	0.520	0.855
ROW	0.012	0.030
USA	0.912	0.960

In the case of EU and ROW, there has not been full diffusion of technical change from USA due to lower values of θ_s in the destinations. The aggregate spillover coefficient (γ_{irs}) is however, of much higher magnitude in EU than in ROW. This is attributed to the higher value of the capture parameter [θ_r] enabling EU to record a much higher rate of TFP. Table 3 shows that, region by region, the overall technical change translates into an equivalent percentage increment of real value-added (row 12). For all the regions, the study computed the change in region-wide real value-added and the change in the aggregate price index of value-added; both measured in conventional units. For USA, following the shock, one-hundred input hours of composite real value-added are equivalent to almost one-hundred and four quantity units of composite value-added measured in constant efficiency units. Consequently, there have been no changes in (measured in conventional units) the solution period, whereas the index of aggregate real value-added measured in constant efficiency units, exhibits an increment equal in magnitude to region-wide improvement in TFP growth. Similar considerations explain the changes in those variables for EU and ROW.

As regards the changes in the GDP deflator, it preserves the same rank and order of magnitude as the ensuing changes (ex post) in competitiveness of the regions. Following the HNTF shock in heavy manufacturing in USA, USA reaps the maximum potential benefits

vis-à-vis its trade partner's which are, EU and ROW, by dint of relatively higher capture of technical change. This implies that USA has the highest spillover coefficient followed by EU and ROW in the second and third rank respectively. Therefore, USA becomes the most efficient player in the world market and EU, having experienced medium-sized technical change, becomes relatively less competitive vis-à-vis the USA, but more competitive vis-à-vis ROW. It is to be noted that USA and EU, despite becoming more competitive as compared to relatively laggard ROW, experience deterioration in their terms-of-trade (TOT) whereas ROW registers an improvement in it (row 7, Table 3). The ordering of these changes in TOT matches the changes in export volumes (row 13, Table 3), and these movements in TOT and the associated changes are dependent on inter-regional competition and compositional changes.

Effects on regional income and components of GDP

From ongoing discussion, it is evident that following the shock aggregate, price index of value-added measured in conventional units [$pva_agg(r)$] increases in each region (row 11, Table 3). Since economy-wide endowments of primary factors are exogenous and does not change, the increase in endowment income is the dominant source of the increase in nominal income in all three regions

Table 5. Simulated regional income, categories of final demand, and selected macrovariables[Ⓞ].

Percentage change	USA	EU	ROW
1. Regional household income [y (r)] (Nominal)	3.71	2.22	0.47
2. Regional income deflator [incdeflator (r)]	-0.60	-0.28	+0.25
3. Regional household income [u (r)] (Real)	4.32	2.50	0.22
4. Regional demand for net savings [qsave] (Real and nominal)	3.71	2.22	0.47
5. (Real) Public consumption [ug (r)]	4.37	2.61	0.16
6. Nominal Public consumption [yg(r)]	3.71	2.22	0.47
7. Nominal Private household expenditure [yp]	3.71	2.22	0.47
8. (Real) Private household consumption [up]	4.35	2.50	0.17
9. Consumer price index [ppriv]	-0.62	-0.28	+0.29
10. GDP price deflator [pgdp]	-0.70	-0.36	+0.37
11. McDougal Terms-of-trade (tot)	-0.76	-0.44	+0.39
12. Aggregate export price index [pxwreg]	-0.63	-0.34	+0.30
13. Aggregate import price index [piwreg]	+0.13	+0.09	-0.09
14. Real value of exports [qxwreg]	3.84	2.50	-0.18
15. Real value of imports [qiwreg]	1.78	1.12	0.90
16. Real GDP from Expenditure and income side [qgdp] (at market prices)	3.97	2.28	0.07
17. Government purchase price index [pgov]	-0.64	-0.38	+0.31
18. Contribution of Endowment income [CON_pfac] (r)	3.35	2.08	0.45
19. Price of Investment goods [pcgds (r)]	-0.55	-0.34	+0.26
20. real Gross regional investment [qcgds (r)]	0.39	0.53	0.66
21. Price index for GNE [NA_prigne]	-0.62	-0.31	+0.29
22. Real Gross National Expenditure [NA_realgne]	3.75	2.12	0.29

Ⓞ Figures in this table are rounded to 2 or, 3 decimal places (author's simulation results).

(compare row 1 with row 18, Table 5). It is to be noted that the change in the price of value-added is governed by the changes in the prices of land, labour and capital. The increase in nominal wage is the same as the increase in regional labour income (row 23, Table 5). With fixed supplies of factors of production and the rise in the economy-wide factor incomes, the percentage increase in wage and rental is almost equal to the percentage change in the nominal factor income.

Under the behavioural assumptions in GTAP for the allocation of regional household income among three income-uses (private household expenditure, PRIVEXP (r); public consumption, GOVEXP (r); and saving, SAVE(r)), each category enjoys a fixed budget share in total regional income. Following the increase registered in nominal income, the fixed budget share of each of these categories translates into equal percentage increases in nominal demand for private and public consumption as well as for saving (rows 4, 6 and 7, Table 5).

The changes in real consumption expenditures are attributed to the differential impacts of movements in public and private consumption deflators (that is, the CPI). The regional income deflator [incdeflator (r)] has the same sign and ranking as the CPI and pgov (compare row 2 with rows 9 and 17). Now, for public and private household consumption, domestically produced traded commodities as a whole, dominate the consumption

baskets as compared to total imported commodities. However, much larger changes in pgov (r) than the CPI are attributed to the relatively higher share of domestically sourced products in the government consumption basket (vis-à-vis private consumption) and their relative price changes (Tables 6 and 7) respectively. From Table 6, the study observes that the difference between pgdp and NA_prigne reflects the percentage deviation of the TOT from the control scenario. Now, pgdp includes the price of exports [pxwreg] with a positive weight as well as the price of domestic consumption. Moreover, pgdp includes the price of imports [piwreg] with a negative weight. On the other hand, the absorption deflator [NA_prigne] includes imports with a positive weight. Therefore, the positive values of piwreg and the negative values of pxwreg in USA and EU lead to a more negative change in pgdp than in NA_prigne. The opposite is the case with ROW. Turning to the case of GNE and its components, the study observes in Table 7 that in the base-case scenario, nominal GNE exceeds GDP for USA and EU, whereas nominal GDP is bigger in magnitude than nominal GNE in the case of ROW. The same is the case in the solution period (compare rows 1 and 2 in Tables 6 and 7). This shows that in both scenarios, USA and EU has trade deficits whilst ROW enjoys a surplus in trade (row 6 in Tables 6 and 7). Although real GNE [NA_realgne (r)] and real GDP [qgdp (r)] register unidirectional

Table 6. Base-case values of GDP, GNE and some shares ^(d).

Base-case value	USA	EU	ROW
1. GNE	5970780	7041530	10288300
2. GDP	5943700	7034240	10322700
3. GNE/GDP	1.004556	1.001036	0.996668
4. Exports [VXWD]/GDP	0.096535	0.104355	0.196077
5. Imports [VIWS]/GDP	0.1078	0.1121	0.2029
6. Trade balance (in million U.S. \$) [= (VXWD + VST -VIWS)]	-27084.2	-7290.16	+34374.46
7. Sales to Global transport sector [VST](at market prices)/GDP	0.007	0.007	0.010

(d) Calculated from base-period data.

Table 7. Post-shock values of GNE, GDP and some related shares ^(e).

Post-shock values of:	USA	EU	ROW
1. GNE	6156260	7168620	10348600
2. GDP	6136480	7168510	10368500
3. GNE/GDP	1.0033	1.0001	0.9981
4. Imports [VIWS]/GDP	0.1064	0.1114	0.2036
5. Exports [VXWD]/GDP	0.0966	0.1046	0.1954
6. Trade balance (in million U.S. \$)	-19783.1	-113.84	+19896.96

(e) All the figures are calculated from post-shock, updated data base.

Table 8. Component-wise effects on pgdp ^(f).

Share weighted values of:	USA	EU	ROW
1. GNE deflator [= NA_prigne × GNE/GDP]	-0.618	-0.313	+0.289
2. Price of exports [= pxwreg × Exports/GDP]	-0.061	-0.036	+ 0.059
3. Price of imports [= piwreg × Imports/GDP]	+0.014	+ 0.011	- 0.017
4. Price of exports for international transportation sector [= ps × VST/GDP]	-0.004	- 0.002	+ 0.003
5. Percentage changes in GDP price deflator [pgdp = (1)+ (2)+ (4)- (3)]	-0.697	-0.362	+0.368

(f) Calculated from base-period data and the figures.

movements in each region, they diverge from each other (compare rows 16 and 22 in Table 8). Since GNE includes (apart from private and public household expenditures) regional demand for gross investment expenditure [REGINV (r)], the study considers the impact of the perturbation on the value of output of capital goods sector in each region. In the current closure, price of the savings commodity (PSAVE) is the numeraire. In the control scenario, USA and EU had trade account deficits and ROW enjoys a trade surplus. The favourable TFP shock enables USA and EU to reduce their trade and saving deficits, whereas ROW sees a decline in its surpluses. However, a larger rise in gross saving coupled with relatively modest rise in gross investment has managed to reduce the 'saving gap' in USA and EU. The opposite is the case with ROW. There has been a higher percentage increase in the value of exports than in the value of imports in both USA and EU; the trade deficits in these

two regions are reduced. With inadequate domestic saving for meeting its relatively large gross investment demand, ROW finances the gap by capital inflow, which shows up here as a fall in its trade surplus (Alam et al., 2009a, b). This is matched by the sum of the improvements in the trade balances of USA and EU (the sources of the capital inflows). Thus, we observe that ROW's surplus has declined by US \$ 14477.3 million. As regards the value of aggregate imports, for ROW, it increases by a larger proportion (0.81%) than the value of aggregate exports (0.12%). In this closure, regional capital stocks in use are kept at their control equilibrium values. With full capacity utilization, the percentage changes in the flow of capital services, ksvces(r), from these stocks are zero as the percentage change in the end-of-solution period capital stock KE(r) depends on the change in real gross investment flows in a region and on the base-period value of the ratio of gross regional investment.

Table 9. Simulated effects on rate of returns and base-period values of some capital-related coefficients ^(a).

Values of:	USA	EU	ROW
1. GRNETRATIO [r]	1.49	1.43	1.45
2. INVKERATIO [r]	0.056	0.066	0.079
3. Percent changes in Rental price of capital [ps(Capital,r)]	3.26	1.96	0.44
4. Percent changes in Price of Capital Goods [ps(CGDS,r) = pcgds (r)]	-0.55	-0.34	+0.26
5. Percent changes in Current net rate of return [rorc(r)]	5.72	3.29	0.26
6. Percent changes in Expected net rate of return [rore(r)]	5.49	2.94	-0.27
7. Percent changes in End of period capital stock [ke(r)]	0.022	0.034	0.052
8. Value of beginning of period capital stock [VKB (r)] (in million US \$)	16107373	21142688	31888734

(a) The figures in this Table are rounded to 2 or, 3 decimal places. Values for the coefficients are reported from base period data.

As the study assumes that the sensitivity of the prospective rate of return (for the period following the solution period) to the prospective proportional expansion in the regional capital stock are the same across all regions, the result shows that a relatively larger percentage increase in KE(r) and a smaller value of current rates of return rorc(r) in ROW cause rore(r) to fall there. On the other hand, a relatively larger rorc(r) and very small percentage increases in KE (r) in USA and EU causes rore(r) to increase in the period following the solution period in these two regions (rows 5 and 6, Table 9). Because the changes in price relativities across regions (after the TFP shock) induce changes in regional TOT, the pattern of inter-regional competition is disturbed. In the case of multi-sectoral analysis, differential impacts on sectoral performance give rise to inter-generic commodity competition depending upon differences in embodiment indexes and in spillover coefficients.

Inter-regional competition via terms-of-trade effects

The preceding discussion shows that the TFP shock erodes competitiveness of ROW whereas, USA and EU, reaping almost the maximum potential benefits, become more competitive than ROW. The changes in price relativities coupled with the Armington (1969) specification of commodity substitution open up the scope for inter-regional competition via international trade. For the global economy as a whole, the study sees that there has been an increase in the quantity index of world trade by 1.11%. As has been mentioned earlier, following the shock, the aggregate volume of exports [qxwreg (r)] increases in the principal beneficiaries of TFP changes, namely, USA and EU, whilst for ROW, it declines. According to base period data, ROW has a higher share (61%) in total world exports in all traded commodities than USA (17%) and EU (22%). A much larger rise in the volume of exports from USA and EU and relatively smaller order of magnitude of fall in the volume of exports from ROW, translate into a rise in the volume of global trade. In fact, the changes in the aggregate real exports of a commodity [qxw (i, r)] and its regional distribution via trade can be

ascribed to the altered productive efficiencies and the resultant price movements.

Turning to the case of the aggregate price index of world trade [pxwwld], the study observes that it falls by 0.01%. Following the same vein of arguments, the study finds that such change has been generated by the percentage changes in the world export price index for each traded goods [px_i (i) = pxwcom (i)]. In effect, following the HNTF shock, the supply prices for all the produced commodities fall in USA and EU, whereas for ROW, they increase. A relatively much larger fall in pxw (i, r) in USA as compared to the falls in these prices in EU translate into a much larger decline in the regional price index of merchandise exports [pxwreg (r)] in the USA than in EU. On the other hand, the rise in pxw (i, r) in all traded commodities in ROW leads to rise in its regional price index for exports. As has been discussed in McDougall (1993), the percentage changes of regional TOT can be decomposed into three components, which are, 'World price effect' (Wpe (r)), 'Export price effect' (Xpe (r)) and 'Import price effect' (Mpe (r)). Without reproducing the detailed derivations, the study rewrites the expressions for the decomposition:

$$\begin{aligned} \text{tot (r)} = & \sum_i (\text{EXP_SHR}(i, r) - \text{IMP_SHR}(i, r)) (\text{px}_i(i) - \text{pxwwld}) \\ & + \sum_i \text{EXP_SHR}(i, r) (\text{pxw}(i, r) - \text{px}_i(i)) \\ & - \sum_i \text{IMP_SHR}(i, r) (\text{piw}(i, r) - \text{px}_i(i)) \end{aligned} \quad (8)$$

Where the first two terms entering with positive signs are Wpe and Xpe respectively, whilst the last term with the opposite sign represent Mpe. In the expression, EXP_SHR (i, r) and IMP_SHR (i, r) are the shares of good i in the total exports from region r and in the total imports into region r respectively; px_i (i) is the world export price index for commodity i; pxw (i, r) and piw (i, r) are respectively the export and import price indexes for good i in region r (Table 10).

The study needs to consider the changes in

Table 10. Decomposition of percentage changes in regional TOT. Source: Author's simulation

GTAP region	World price effect (Wpe)(1)	Export price effect (Xpe) (2)	Import price effect (Mpe) (3)	Total TOT effect [tot (r)] (4)= (1)+(2)-(3)
USA	-0.03	-0.60	+0.13	-0.76
EU	-0.04	-0.31	+0.09	-0.44
ROW	+0.02	+0.29	-0.08	+0.39

Table 11. Base-period values of regional net exports of commodity^(a).

GTAP sector	Region		
	USA	EU	ROW
1. PrimaryInds	-32802.95	-104356.23	+95077.3
2. FoodProds	+5659.86	+7762.96	-24900.9
3. Textl_LMfg	-73690.23	-29529.23	+56075.22
4. HeavyManuf	-23183.69	+40137.31	-107725.1
5. Services	+96932.8	+78695.1	+15847.84

(a) Calculated from the base-period data. Negative sign indicates imports in that commodity into a region.

commodity-specific world export price indexes $[px_i(i)]$. These export price indexes for the commodities are share-weighted averages across regions of the aggregate exports price index of commodity 'i' from exporting region 'r' $[px_w(i, r)]$; the weights being the shares of region r's exports in global exports for i $[SW_{IR}(i, r)]$. In a multi-sectoral model, the changes in these price indexes manifest themselves as inter-generic commodity competition. From Equation (8), it is evident that, from region r's point of view, the world price effect $Wpe(r)$ is an inner product across the commodities 'i' it produces of its net exports of 'i', and of the percentage change in the deviation of the world price index of 'i' from the global average price index of all commodities. This component of $tot(r)$ will be large and positive if there is a strong positive correlation between the generic commodities that 'r' specializes in exporting and the commodities whose relative prices rise most in the world market. In Table 10, the study observes that $Wpe(r)$ in USA and EU are of opposite signs from those in ROW. So far, as the base-period shares of exports of each commodity in aggregate world exports of all the commodities from all the regions are concerned, heavy manufacturing has the highest share (47%) followed by services (24%), textiles and light manufacturing (14%) and primary industries (12%) with food products having negligible share (0.04%). As is suggested by Table 11, EU is a net exporter in heavy manufacturing, food products and services, whereas USA is a net exporter of food products and services (columns 1 and 2). Despite having larger shares in total world exports of all commodities than USA and EU, ROW is a net importer in heavy manufacturing and food products (see numbers with negative signs in column 3).

Tables 12 and 13 present the sector-wise regional

export and import shares in total regional export and imports respectively. These are used to calculate the Wpe in Equation (8). After the shock, world export price indexes $[px_i]$ for all the traded commodities, except those for heavy manufacturing and services, increase (column 4, Table 14). The changes in the regional market prices of each commodity preserve the identical sign, order of magnitude and ranking across regions as the changes in regional aggregate commodity prices received for tradable products in a particular region $[psw(r)]$; compare row 6 with other rows for individual columns for the regions in Table 14. The sectors in which EU is a net exporter (namely, in food products, heavy manufacturing and services) experience declines or very small increases in world export price indexes, whereas the world export price indexes for all the goods in which EU is a net importer (which are primary industries and textiles, light manufacturing) inflate.

Considering $Xpe(r)$ and $Mpe(r)$, the second and third right-hand terms in Equation (8), the study can infer that their contributions to 'tot' depend in each case on a trade share and on a relative price movement. The respective price terms are the changes in relativities between $px_w(i, r)$ and $pi_w(i, r)$ vis-à-vis $px_i(i)$. However, the extent of such relative price divergences depends, à la Armington specification (1969) of inter-generic commodity substitution, on the degree of product differentiation by location of production. Thus, the changes in price relativities between region-specific varieties of the same commodity class have effects on changes in tot through $px_w(i, r)$ and/or, $pi_w(i, r)$. The divergences between $px_w(i, r)$ received by exporting region r and the world price index of good 'i' $[px_i(i)]$ depend, apart from the magnitude of the shock, on the values of the Armington elasticity so

Table 12. Base-period shares of sectoral exports in total regional exports ^(a).

GTAP sector	Region		
	USA	EU	ROW
1. PrimaryInds	0.07	0.04	0.17
2. FoodProds	0.04	0.05	0.04
3. Textl_LMfg	0.07	0.12	0.16
4. HeavyManuf	0.53	0.48	0.45
5. Services	0.29	0.32	0.19
Total	1.00	1.00	1.00

(a) Calculated from the base-period data.

Table 13. Base-period shares of sectoral imports in total regional imports ^(a).

GTAP sector	Region		
	USA	EU	ROW
1. PrimaryInds	0.11	0.15	0.11
2. FoodProds	0.03	0.03	0.05
3. Textl_LMfg	0.17	0.14	0.12
4. HeavyManuf	0.51	0.40	0.48
5. Services	0.19	0.27	0.24
Total	1.00	1.00	1.00

(a) Calculated from the base-period data.

Table 14. Simulated effect on export price indexes (regional and global) ^(a).

GTAP sector	Region			
	USA (1)	EU (2)	ROW (3)	WORLD(4)
1. PrimaryInds	-0.67	-0.19	+0.35	+0.22
2. FoodProds	-0.65	-0.18	+0.32	+0.02
3. Textl_LMfg	0.63	-0.29	+0.30	+0.10
4. HeavyManuf	-0.61	-0.35	+0.27	-0.05
5. Services	-0.67	-0.38	+0.34	-0.10
6. psw (r)(b)	-0.61	-0.34	+0.29	-
7. Simple Average of pxw (i, r)	-0.65	-0.38	+0.32	-

(a) Simulation results of 4% TFP shock.

that for low elasticity of substitution, these divergences will be larger.

The magnitude and directions of the changes in $px_i(i)$ are driven by the changes in regional aggregate export price indexes, that is, $pxw(i, r)$. For USA and EU, $pxw(i, r)$ falls in all industries whereas it increases in all the industries in ROW (Table 14). However, in the case of USA, the fall in these prices in all the traded goods is almost double the rise $pxw(i, r)$ in ROW; in EU, except for heavy manufacturing and services, the falls in these price indexes are relatively smaller in magnitude than the increase $pxw(i, r)$ in ROW. From the last row of Table 14 (which shows changes in average export prices received by each region), the study observes that compared to the

USA, the relative price changes in ROW are more pronounced than in EU. In other words, the average price index across sectors of tradable commodities produced in ROW inflates, relative to both EU and USA. The relative rises in the average price of ROW commodities compared to those produced in the USA and EU are equal to 0.9 [= -(-0.61-0.29)] and 0.63 [= -(-0.34-0.29)]% respectively. Although the changes in competitiveness between region- and sector-specific commodities are dominated by the changes in sector-wide relative supply prices, a glance at Table 14 reveals that the impact of the technological improvement is not so uniform across sectors in EU as it is in the other regions. This has been governed by the magnitude of the sectoral embodiment indexes

and spillover coefficients. Divergences between the export price for the exportable, produced by any region and the average world price, dominate the changes in tot. Whilst there is some inter-commodity variation within columns of Table 14, it is small, relative to the variation of shares within columns of Table 12. Therefore, to a first approximation, we expect that the X_{pe} for the three regions can be calculated as the simple mean over commodities of the region's commodity price deviations from commodity-specific global export prices. Because there is more variation across commodities of price changes within columns than previously, the method does not work as well as it did with exports. Nevertheless, the co-variation within regions of shares with price movements seems to be second-order.

Stylized numerical assessment

The study adopts a stylized model, based on the constant elasticity of substitution [CES] production function the underlying rationale being that at the bottom level, the firm combines the material inputs sourced from overseas and domestically, using CES technology. However, the study applies the CES production function and the relevant shares at the 'macro' or regional level where each region is assumed to be the supplier of generic "commodities".

This is based on the assumption that if the inter-regional price competition explains most of the changes in the pattern of trade, then the changes in the quantity indexes and the relevant market shares would predominantly be accounted for by the accompanying changes in the region-wide prices.

In order to approach the problem, the study considers the shares of the value of imports (at importers' market prices) of all the traded commodities from foreign sources [VIM_i(r, s)] (and also of the region's own supply) in the domestic absorption of the traded goods in each region. Now, GNE(r) of a region 'r' shows the domestic absorption of commodities by private households, public consumption and gross regional demand for capital formation. To isolate the contribution of solely imported stuffs in the domestic absorption, the study needs to exclude from GNE(r) the item which does not use the foreign-sourced intermediates.

As the 'dwellings sector' is non-traded (with some negligible trade flows from the services sector), the study excludes the value of output of the dwelling services in each region [VOM(dwellings, r)].

The adjusted GNE of region 'r' [GNE_ADJ(r)] is obtained as net of dwelling sector's output [VOM(dwellings, r)]. The share of the bilateral imports [VIM_i(r, s)] in GNE_ADJ(r)—SH_MGNEADJ(r, s), measures the extent of import penetration by region r in the gross domestic absorption of traded commodities in recipient 's'. The changes in such shares between the base-case and shocked solution show the changes in the domestic

demand for source-specific "product". On the basis of simplifying assumption, the study uses the following mathematical expressions derived from the CES production function:

$$S_{rs} = \frac{\delta_s^\sigma P_s^{\rho\sigma}}{\sum_{k \in R_s} \delta_k^\sigma P_k^{\rho\sigma}} \tag{9}$$

Where S_{rs} is the relevant share of supplier 'r' in market 's' [SH_MGNEADJ(r, s)] and P_s is the average region-wide price index for the tradable in region 's'. In (9), ' R_s ' stands for the two foreign sources of import as well as the recipient's own supply. σ [= 1/(1+ ρ)] is the global Armington substitution elasticity. Also, the distribution parameter for each source's supply in the adjusted GNE of region 's' is computed as:

$$\delta_s = \frac{P_s X_s^{1/\sigma}}{\sum_{k \in R_s} P_k X_k^{1/\sigma}} \tag{10}$$

Where the δ_k are the three CES distribution parameters related to the sourcing of stuffs in 's'. Log-linear transformation of (9), after algebraic manipulation, yields:

$$d \ln S_{rs} = \rho\sigma d \ln P_s - \frac{\sum_k \delta_k^\sigma P_k^{\rho\sigma} (d \ln P_k)}{\sum_{k \in R_s} \delta_k^\sigma P_k^{\rho\sigma}} \tag{11}$$

Where $d \ln S_{rs}$ is the logarithmic change in the share of supplying source r in the adjusted GNE of region 's' between base- and snapshot solutions, whereas $d \ln P_s$ is the change in the average region-wide price index. The P_k in Equations 9, 10 and 11 refers to the updated price in the solution period and are used for calculations of the relevant distribution parameters (via Equation (10)) and for evaluating the right-hand side of Equation (11). The numerical calculation involves computation of the right-hand side of Equation (11).

If inter-regional competition at the macro level were to dominate the change in the calculated shares [S_{rs}], then the right-hand side and the left-hand side of Equation (11) would match almost exactly. However, the calculation using the simulated values of the relevant variables reveal that given the high degree of non-linearity in the postulated relationship via the equations, these two do not match; all signs but one, though, do match. This signifies that the study cannot discern definitely that inter-regional competition per se explains the change in

Table 15. Percentage changes in bi-lateral imports in the tradeable in USA^(a)

GTAP sector	Source of import	
	EU (1)	ROW (2)
1. PrimaryInds	4.23	1.57
2. FoodProds	1.90	-0.34
3. Textl_LMfg	5.03	1.50
4. HeavyManuf	4.39	0.71
5. Services	4.26	1.43

(a) Simulated effects of 4% TFP shock in Heavy manufacturing in USA.

regional demand for tradable. Thus, there is room for inter-generic commodity competition.

In effect, following the shock, the regional aggregate export sales of commodity 'i' [$qxw(i, r)$] increase (Tables 15 and 16). For the two major beneficiaries of the TFP improvements (for example, USA and EU), the study finds only rises in these quantity indexes of exports. By contrast, for the relatively technologically laggard region ROW, $qxw(i, r)$ declines in heavy manufacturing and food products with a very small rise in services (Table 15).

Comparing USA and EU, the study finds that the much larger fall in $pxw(i, r)$ in USA than in EU (as is evident from Table 14) causes the aggregate volume of exports in all the traded commodities [$qxw(i, r)$] from USA to rise by a higher percentage than those from EU. However, the changes in the volume of regional aggregate merchandise exports [$qxw(i, r)$] entails changes in the composition of bi-lateral imports in commodity 'i' from source 'r' to destination 's' [$qxs(i, r, s)$]. Taking any region 's' as the destination of exports of 'i' from sources 'r', $qxs(i, r, s)$ gives percentage changes in imports of 'i' from source 'r' to recipient 's'. Now, $qxs(i, r, s)$ depends on the Armington elasticity, on the size of the expansion in regional aggregate import demand for 'i', on the import share of the other source region 'k' ($k \neq r \neq s$) in total imports into 's' and the divergence between the price of imported source 'k' to 's' [$pms(i, k, s)$]. Considering USA as the destination of exports from EU and ROW, the study observes that the percentage increases in the volume of imports from EU are uniformly greater than those from ROW (compare columns 1 and 2, Table 15). Since the market prices of the tradable imported from ROW to USA [$pms(i, ROW, USA)$] registered a positive increment as opposed to falls in the import prices for tradable from EU [$pms(i, EU, USA)$], the relative price changes in favour of EU, translate into a higher percentage increase in demand for commodities in USA imported from EU as opposed to imports from ROW.

Similar consideration explains the much larger percentage increases in bi-lateral imports of the tradable into EU's market from USA than from ROW (compare columns 1 and 2, Table 16). By contrast, in case of ROW

(a composite region), there are substantial intra-regional trade flows so that the changes in price relativities between ROW itself and the other supplying regions determine the percentage changes in bi-lateral import sales in ROW [$qxs(i, r, ROW)$].

In ROW's market, USA faces competition from ROW itself (supplying 50% of total imports) and EU (supplying 29% of ROW's imports). USA and EU export respectively 73 and 81% of their export sales (excluding sales to global transport sector) to ROW. The decline in intra-regional imports in all the traded goods in ROW can be ascribed to the rise in the prices of the intra-regional imports from the constituent regions relative to USA and EU. Thus, for USA and EU, trade creation occurs, whereas ROW loses share in its own market causing trade diversion. Of course, the differences in regional performances in merchandise exports from each sector depends on improvements in productive efficiency at the sectoral level in the sense that after the total factor productivity improvements, some sectors perform better than some other sectors.

This passes through the differential industry effects and the relative price divergences. As a preliminary step, the study constructs indexes of revealed comparative advantage by sector by region [RCA(i, r)] (Table 17). Commodity-specific ranking show that USA has its highest RCA index values (that is, greater than unity) in heavy manufacturing and services whereas EU has its highest values for the RCA indexes in food products and services.

Inter-generic commodity competition and multi-sectoral effects

As noted earlier, there has been uneven distribution of productivity enhancements across sectors, especially in EU. Specifically, in EU, primary industries and food products are the sectors which experience relatively lesser percentage decreases in their export price indexes as compared to the other three sectors.

As expected, this can be ascribed to the differentials in 'i' from source 'r' to 's' [$pms(i, r, s)$] vis-à-vis that from the embodiment indexes and sectoral spillover coefficients. Considering the case of the two client regions of embodied technological spillover (EU and ROW), it is evident that these indexes depend on the source and user sector-specific trade-embodiment index (Equations (1) and (5) and columns 2 and 3 of Tables 18 and 19).

A glance at these tables reveals that the embodiment indexes for some of the sectors in EU (namely textiles and light manufacturing, heavy manufacturing and services) are higher than those in ROW for these industries. Although the E_{irjs} indexes do not vary greatly between EU and ROW, the magnitude of the sectoral higher order of magnitude than those in ROW (compare all the rows in columns 2 and 3, Table 19).

Table 16. Percentage changes in bi-lateral import in the tradeable in EU^(a).

GTAP sector	Source of import	
	USA (1)	ROW(2)
1. PrimaryInds	5.66	0.67
2. FoodProds	4.18	-0.23
3. Textl_LMfg	6.17	0.61
4. HeavyManuf	4.87	-0.28
5. Services	4.26	0.31

(a) Simulated effects of 4% TFP shock in Heavy manufacturing in USA.

Table 17. Revealed comparative advantage in base-period in the regions^(a).

GTAP sector	Region			REMARK(4)
	USA (1)	EU (2)	ROW (3)	
1. PrimaryInds	0.558	0.306	1.382	ROW:Rank 1
2. FoodProds	0.993	1.174	0.938	EU: Rank 1
3. Textl_LMfg	0.534	0.867	1.183	ROW:Rank 1
4. HeavyManuf	1.126	1.028	0.954	USA: Rank 1
5. Services	1.248	1.349	0.801	EU: Rank 1
REMARKS(a)	Services: Rank 1	Food products: Rank 1	Textl_LMfg: Rank 1	—

(a) Computed from the GTAP's base-period database. Rank in this column refers to commodity-specific ranking across regions. Rank in this row refers to ranking across sectors in a region.

Table 18. Base-period values of sectoral embodiment indexes^(a).

GTAP sector	Region		
	USA (1)	EU(2)	ROW (3)
1. PrimaryInds	0.858	0.012	0.006
2. FoodProds	0.946	0.009	0.006
3. Textl_LMfg	0.887	0.019	0.009
4. HeavyManuf	0.832	0.029	0.018
5. Services	0.872	0.027	0.012

(a) Calculated from the base-period data.

Table 19. Base-period values of sectoral spillover coefficients^(a).

GTAP sector	Region		
	USA (1)	EU (2)	ROW (3)
1. PrimaryInds	0.994	0.526	0.007
2. FoodProds	0.998	0.505	0.007
3. Textl_LMfg	0.995	0.563	0.011
4. HeavyManuf	0.993	0.597	0.020
5. Services	0.995	0.592	0.014
6. Simple Mean	0.995	0.557	0.012
7. Ranges	[0.993, 0.998] = 0.005	[0.505, 0.597] = 0.092	[0.007, 0.020] = 0.013

(a) Calculated from the base-period data.

Since the magnitude of the economy-wide capture parameter is much higher in EU (0.85) than that in ROW

(0.03), this magnifies the values of the sectoral spillover coefficients in EU as compared to ROW. Comparison

Table 20. Simulated effects on sectoral TFP growth in each region ^(a).

GTAP sector	Region		
	USA (1)	EU (2)	ROW (3)
1. PrimaryInds	3.98	2.09	0.03
2. FoodProds	3.99	2.00	0.03
3. Textl_LMfg	3.98	2.24	0.04
4. HeavyManuf	4.00	2.38	0.08
5. Services	3.98	2.36	0.06

(a) Author's simulation results of 4% TFP shock.

across sectors within USA and ROW indicates that there is less variation in spillover coefficients in each of these two regions than in EU (the ranges in columns 1, 2 and 3 are 0.005, 0.092 and 0.013 respectively). As opposed to this, in EU, the range of variation at 0.092 is larger (the last entry in column 2 of Table 19). Moreover, the values of spillover coefficients for primary industries and food products are lower than the values for the coefficients in heavy manufacturing, services and textiles, light manufacturing (compare figures in rows 1 and 2, column 2 in Table 19 with those in rows 3, 4 and 5 in column 2). That is, the wider variation in column 2 is largely due to the difference between the spillover coefficients in the first two sectors relative to the rest. Since primary industries and food products reap lesser potential benefits from the endogenous technology spillover (via Equations (1) and (5)) than the other three sectors, the percentage decline in the relative prices of these two sectors are not so pronounced like the three remaining traded sectors. Closer inspection of the figures in column 1 in both tables suggests the fact that the largest accrual of productivity gains in USA is due to its sourcing of a relatively high proportion of the technologically advanced input (that is, heavy manufacturing) from its own market.

This implies that it captures the highest embodied domestic technology spillover in every sector. Given the assumptions about relatively lower endowments of capture-parameters in both EU (0.85) and ROW (0.03) as compared to USA (0.96), it accords well with the prior expectations. So far, as the endogenous TFP improvements in the three regions are concerned, there is not much variation across sectors within a region (especially in USA and ROW). Table 20 reports these values.

Note that in USA, the origin of the technological improvement, the values of both of the indexes for embodiment and spillovers are of greater magnitude than the corresponding indexes in EU and ROW. Considering the technology transmission of Equations (6) and (7), the study sees that the magnitudes for the endogenous HNTF changes between the base-case and shocked solution are contingent on the base-case values of the spillover coefficients as well as on the magnitude of the

exogenous TFP shock in heavy manufacturing in USA.

Conclusions

In this article, embodied technology transmission through bi-lateral trade linkages has been analysed in a multi-sectoral, multi-regional framework.

The analysis suggests that regional differences in transmitted productivity changes, dominate the results.

However, the analysis of changes in market shares of each of the trading regions in their partners' markets indicates that the effect of the TFP improvement in heavy manufacturing in the USA has been more or less uniform across sectors within regions (Alam, 2009a, b). This can be partially explained by relative uniformity of embodiment indexes and spillover coefficients within regions, based on regional trade patterns in the base-period. The study has seen that inter-regional competition, inter alia, depends on the TFP shock-induced relative price effects. The Armington (1969) assumption of product differentiation by origin keeps open the scope for inter-generic commodity competition. As the products are differentiated by sources, divergences between the export supply price of tradable in any region and their average world price have led to changes in regional terms-of-trade and also in inter-commodity substitution. The relative decline in the price of Armington substitutable imports in the principal beneficiaries of technical change (USA and EU) have caused substitution in favour of traded commodities imported from USA and EU in ROW.

The study has observed that in GTAP, Armington elasticity of substitution between imports from different sources are assumed to be identical across regions. That is, the substitution elasticity's vary only by commodity. Notice that the relative strength of substitution between imported commodities depends on the values of Armington elasticity's of substitution [$\sigma_M(i)$]. Conjecture that allows more variations in the substitution elasticity's across sectors as well as regions could change the flavour of the results. Because standard GTAP does not allow regional variation in substitution elasticity's, the

Table 21. Simulated effects on percentage changes in bi-lateral trade flows with alternative Armington elasticity ^(a).

Source of import	Destination region		
	USA (1)	EU (2)	ROW (3)
USA	0.00	0.70	1.41
EU	0.77	0.00	1.38
ROW	0.70	0.59	1.30

(a) Simulation results of 4% TFP shock.

Table 22. Simulated effects on regional export price index with alternative Armington elasticity ^(a).

Export price index for heavy manufacture	USA	EU	ROW
pxw (i, r) [New]	-0.83	-0.46	+0.36
pxw (i, r) [Old]	-0.61	-0.35	+0.27

(a) Simulation results of 4% TFP shock.

study can only test the conjecture with respect to their variations across commodities. To do this, the study runs a simulation with modifications in the default parameter settings of the Armington elasticity. Since in standard GTAP's treatment, such elasticity of substitution are hard-wired to commodities and are invariant across the three regions, the study assigns a new set of values for the commodity-specific Armington parameters. The study chooses a very low value for the elasticity of substitution in heavy manufacturing sector [that is, $\sigma_M(i) = 0.1$] whereas for the rest of the traded sectors, the study assigns a common higher value [that is, $\sigma_M(i) = 6$] (Tables 21 and 22).

The results accord well with the expectation. Taking ROW as the destination, it is evident that the percentage increases in bi-lateral exports of heavy manufacturing to ROW from USA and EU are lower than the corresponding numbers obtained in the previous simulation (compare numbers in column 3, Table 22 with those in Tables 16 and 17). More importantly, ROW registers an increase in intra-regional imports in heavy manufactures. Although there has been a decline in the price of heavy manufactures in both USA and EU, with a very low Armington elasticity in this sector, the scope for substitution of heavy manufactures imported from overseas with ROW's own supply is limited. Although there is a price incentive for ROW to substitute heavy manufactures from abroad (Table 22), there is limited technical scope to do so, so it relies on its own supply of heavy manufactures, resulting in a 1.3% increase in its intra-regional imports. Further work on sensitivity to Armington elasticity is called for. In particular, differences in substitutability by source region (as well as by commodity) may well change the main feature of the results presented, that is, fairly uniform TFP effects across commodities within any given region.

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Full Length Research Paper

Customer equity promotion based on the measurement model with four-dimensional drivers: Application to mobile communication

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The theory which takes customer as an asset has been widely recognized by researchers and practitioners. They proposed lots of measurement models to measure and manage customer equity. But in the research of customer equity promotion, most methods only depend on qualitative analysis. Taking mobile communication enterprise for example, using the measurement model with four-dimensional drivers to obtain quantitative data and combining qualitative analysis of customer equity drivers, this study proposed relevant strategies to promote customer equity of the enterprise. Based on the survey and data analysis of 357 customers from a provincial capital in China, the results showed that the model could determine the weight coefficients of customer equity drivers and their significance, as well as help to develop promotion strategy of customer equity.

Key words: Customer equity, drivers, measurement model, four-dimensional drivers, customer equity promotion.

INTRODUCTION

In 2008, IBM research team established Customer Equity and Lifetime Management solution. This solution helps enterprise to control and manage customer values and optimize long-term customer relationships, as well as maximize the value/risk ratio of the overall customer portfolio. Theories of customer lifetime value and customer equity are just the core of the solution. Since proposed, the theory of customer equity has been widely recognized by researchers and practitioners. Followers of customer equity believe that customer is an intangible asset which creates profits and brings values for enterprises. In a competitive market, a firm's ability to acquire and retain customers is the true source of its sustainable competitive strength. Therefore, in order to improve this strength, increasing the value of customer equity-customer equity promotion, becomes the primary task of an enterprise. However, most strategies, based on researches of customer equity promotion, merely depend on the qualitative analysis of firm's customer equity and

its drivers. On basis of previous research results, this paper will show a model which could not only measures customer equity but also analyzes the drivers quantitatively.

Customer equity is the sum of the lifetime value of all existent and potential customers of a firm, and customer lifetime value refers to the discounted present value of a customer's contribution to enterprise during his/her life (Rust, 2000). Customer equity promotion means the maintenance and increment of the equity, and its process refers to developing loyalty customers on one hand, and making best of customer value on the other hand (Wang, 2001). Scholars carried out abundant researches on customer equity promotion, but most traditional studies indicated the direction corporate should strive to just from qualitative analysis (Blattberg, 1996; Srivastava, 1998; Leyland, 2000). In recent years, some scholars incorporated quantitative method to study customer equity promotion, but they just studied effect of several variables or drivers on customer equity (Wagner et al, 2009; Bruhn et al, 2008; Dong et al, 2007; Drèze et al, 2005; Panda, 2003) rather than analyzing the all drivers and specifying which drivers are more important and worthy of more marketing resource.

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Rust et al. (2000, 2004) proposed that a firm could manage and promote its customer equity by improving the drivers and this viewpoint was widely recognized. They discussed that the management through the three drivers, value equity, brand equity and relation equity, would be more easy to operate and more effective. Based on this point, they established Return on Marketing Model to measure customer equity. This model can also figure out each driver's weight coefficient which reflects its importance to customer equity promotion. Compared with other researches, Return on Marketing Model calculates the weight coefficients of drivers using econometrics and statistics methods, and then develops promotion strategies. Thus this method is more visual and accurate.

Although Return on Marketing Model could determine each driver's importance and provide effective evidences to develop promotion strategies, it ignores two factors: word-of-mouth and cross-buying, which causes underestimate of customer equity value and incomplete analysis of customer equity promotion. Large researches proved that the two variables were very important to customer equity and could not be ignored (Reinartz and Kumar, 2003; Kumar et al, 2008; Bettencourt, 1997; Wangenheim and Bayón, 2007; Villanueva et al, 2008; Verhoef et al, 2001; Ngobo, 2004; Bolton et al 2004). Therefore, this paper considers the effect of word-of-mouth and cross-buying on customer equity, and chooses the measurement model with four-dimensional drivers (Shao, 2009). Based on reserving all advantages of the old model, this model modifies Return on Marketing Model, and adds new driver---perception driver, which is made up of two sub-drivers: word-of-mouth and cross-buying.

Then we apply the new model to determine the size of each sub-driver's impact factor on customer equity, and propose strategies to promote customer equity of mobile communication enterprise, combining with qualitative analysis of its drivers.

METHODOLOGY

Qualitative analyses

This paper will analyze customer equity drivers of mobile communication corporate based on the four-dimensional driving model (Shao, 2009). In the four-dimensional driving model, customer equity is influenced by value driver, brand driver, relationship driver and perception driver.

Value driver

Value driver refers to customer's objective evaluation of the product or service on basis of the comparison of the cost he/she paid and the delivered value he/she achieved. The ultimate purpose why a customer trades with enterprise is to achieve largest customer delivered value, thus brand driver, relationship driver and perception driver can be utilized only when the enterprise provides enough delivered value to satisfy the customer. Therefore, value driver is

the foundation of research on customer equity. Specifically, value driver includes quality, price and convenience.

The services a mobile communication firm provides contain core services and support services (Zhang, 2007). Core services are wireless communication services, and quality firstly refers to the clarity, smooth and signal coverage of the wireless communication. Support services are provided to facilitate customers to use core services, including establishment of business offices, agent network, after services and so on, thus quality also includes the quality of support services. Price in mobile communication is the fee level, and lower level is prior when quality is similar (Zhao, 2006). Convenience mainly means how conveniently customer gets services, including whether the branches are sufficient, the distribution is reasonable, the services are speedy and pay for the phone through network or prepaid card.

Brand driver

Brand driver is customer's subjective evaluation on corporate brand image and brand meaning. Brand could promote customer equity because it reflects the spirit and value of products and services. When the spirit and value is recognized by customers, the brand will win their preference (Jin, 2006). Thus brand could not only attract new customers, but also remind old customers, as well as enhance the relationship between customer and company (Wang, 2002). Brand driver includes brand preference, advert publicity, corporate reputation and commonweal activity.

For mobile communication firms, brand preference comes from customers' recognition of the brand image and brand spirit. It contributes to acquire customer loyalty, and it could not only increase corporate profit, but also buffer the negative influence from competitive behavior (Fournier, 1998). Advert publicity is an effective method to increase popularity, actually means how much attention customer pays on the advert and impact of the advert on customers' transaction behavior. Mobile communication firm can attract new customers through advert publicity, as well as constantly remind old customers to purchase repeatedly. Corporate reputation means corporate public credit and fame in society. It is a comprehensive evaluation from various circles including consumers. With public trust, it influences the purchase intention of customer significantly (Jiang, 2002). Commonweal activity is a way for mobile communication firms undertaking social responsibility, thus active participation in commonweal activity can improve brand's awareness and impress customers with a positive image, as well as make customer recognize the brand better, and promote brand image and competitiveness at last.

Relationship driver

Relationship driver refers to the firmness of the relationship between customer and enterprise. Its effect on customer equity promotion mainly shows on two aspects: increasing the possibility of repeat purchase and decreasing the possibility of switching supplier. From the two aspects, sub-drivers of relationship driver are loyalty program, preferential policy, special treatment, group activity, customer's understanding of firm, firm's understanding of customer and customer's trust of firm.

Loyalty program is incentive measures to stimulate consumption and retain customers. For mobile communication firms, it mainly refers to accumulation of consumption points and point reward. Preferential policy is also a mechanism to stimulate consumption, mainly refers to discount or gifts. Special treatment, mainly aiming at high-level customers, means providing services which general customers can not enjoy, for example, VIP of GoTone of China Mobile could enjoy some services such as presenting professional service journals, special airport services. Group activity means

mobile communication firms make parties for customers to build customer group and maintain the connection of customer and firm. Customer's understanding of firm means how much customer knows about firm's history, business circumstance, prospect and service process. Firm's understanding of customer refers to firm's knowing about the information, consumption demand and consumption characteristics of customer. Mutual understanding between customer and firm is the foundation of satisfied services, and it could enhance the recognition and trust of customer to firm. Customer's trust of firm generates from customer satisfaction; it refers to customers' recognition and confidence of the firm. Only when customer satisfies with the purchase or experience, recognition and repeat purchase could emerge, then trust comes into being. For mobile communication firms, superior services, competitive price and brand personality can strengthen customer's trust of firm.

Perception driver

Perception driver is very important for customer equity drivers. Early studies have not brought perception driver into the driving model of customer equity, but several scholars proposed that customer equity is also subject to some non-purchasing behaviors which are difficult to observe and forecast (Hogan, 2003; Verhoef, 2002). These factors are closely associated with customer perception - the perception driver. It consists of word-of-mouth and cross-buying.

For mobile communication firms, word-of-mouth is a process that customers spread their evaluation of the firm's products or services to others and make influence on others' impression of the firms' products or services, which would influence customers' selection. Word-of-mouth has two different situations: positive and negative. Positive word-of-mouth will increase purchase and customer equity, while negative decrease. Cross-buying refers to customer's purchases of other products or brands provided by the same firm for previous satisfactory experiences, no matter whether the customer knows about the firm. Because of previous experiences, customer was impressed rightly, and then purchase of other brands or services of the same mobile communication firm happens.

Quantitative analyses

This paper applies the measurement model with four-dimensional drivers (Shao, 2009) to calculate the weight coefficients of sub-drivers of customer equity of mobile communication firm, and then supplies evidences to develop promotion strategies for the firm.

Index system and data collection

According to the qualitative analysis of customer equity drivers of mobile communication firms, we establish the index system as follows. *j*: firm selected now, *U*: brand utility, *exp*: expenditure per month, *X*₁: quality, *X*₂: price, *X*₃: convenience, *X*₄: brand preference, *X*₅: advert publicity, *X*₆: corporate reputation, *X*₇: commonweal activity, *X*₈: loyalty program, *X*₉: preferential policy, *X*₁₀: customer's understanding of firm, *X*₁₁: firm's understanding of customer, *X*₁₂: special treatment, *X*₁₃: group activity, *X*₁₄: customer's trust of firm, *X*₁₅: word-of-mouth, *X*₁₆: cross-buying, *X*₁₇: brand inertia. In the system, *X*₁, *X*₂ and *X*₃ reflect the value driver; *X*₄, *X*₅, *X*₆ and *X*₇ correspond with the brand driver; *X*₈, *X*₉, *X*₁₀, *X*₁₁, *X*₁₂, *X*₁₃ and *X*₁₄ reflect the relationship driver; *X*₁₅ and *X*₁₆ correspond with the perception driver. Brand inertia (*X*₁₇) doesn't reflect any driver, and it is one of the characteristics of consumer behavior.

Data in this paper were collected through questionnaires. The questionnaires mainly contain two parts: one part is customer's

information, including education background, profession, income etc. The other part is questions aiming at the four drivers of customer equity, and each question corresponds to one variable in the index system.

The respondents were selected at random. 400 questionnaires were issued and finally 357 questionnaires were processed while 43 pieces were disqualified.

Data analysis

Firstly, we carried out principal component analysis on the data with SPSS (statistical package for social sciences) to solve overlapping information problem and simplify calculation process, because customer equity is restricted by many factors and there are anfractuous relations among them. The result is showed in Table 1. Shao et al. 2009

According to the results in Table 1, we extracted two principal components, and their cumulative ratio is 66.366%.

Table 2 shows the component score coefficient matrix which reflects the linear relations between principal components and original variables.

In order to figure out brand utility, we adopted logistic regression analysis, and the result is showed in Table 3. Shao et al. 2009

Combining brand utility with component score coefficients, we could determine the weight coefficients which reflect the influence of sub-drivers on brand utility. As can be seen from Table 4, (Shao et al. 2009) all coefficients are positive numbers.

Principal component analysis of the data from questionnaires was carried out. Table 1 shows the result. Then we extracted two principal components based on the standard that the eigenvalue should be bigger than 1. Their cumulative ratio is 66.366%, this means they explained the total variance for 66.366%.

Table 2 shows the component score coefficient matrix, which reflects the relation between original variables and component we extracted. For example, the first component could be expressed as follows:

$$F_1 = 0.084X_1 + 0.077X_2 + 0.082X_3 + 0.078X_4 + 0.077X_5 + 0.081X_6 + 0.073X_7 + 0.078X_8 + 0.082X_9 + 0.074X_{10} + 0.074X_{11} + 0.074X_{12} + 0.068X_{13} + 0.076X_{14} + 0.079X_{15} + 0.074X_{16} + 0.054X_{17}$$

We used logistic regression analysis to capture the relations between principal components and brand utility. Table 3 shows the result. And brand utility can be expressed as follows:

$$U = 2.378 + 4.274F_1 - 0.575F_2$$

Combining results in Table 2 with Table 3, we could figure out the relation between original variables and brand utility. That is the coefficient we pursued.

RESULTS AND DISCUSSION

Promotion strategies for value driver

Value driver includes quality, price and convenience and in this study their coefficients are 0.521578, 0.332194 and 0.551596 respectively. Overall, coefficients of value driver are the biggest, which shows the importance of value driver, so the firm should allocate more resource into this driver.

Quality has great influence on customer equity for its

Table 1. Total variance explained.

Component	Initial eigenvalue		
	Total	% of variance	Cumulative %
1	10.255	60.323	60.323
2	1.027	6.044	66.366
3	0.763	4.489	70.855
4	0.687	4.043	74.898
5	0.556	3.273	78.171
6	0.509	2.994	81.165
7	0.481	2.831	83.996
8	0.419	2.465	86.461
9	0.396	2.327	88.789
10	0.361	2.122	90.911
11	0.304	1.786	92.698
12	0.288	1.693	94.391
13	0.247	1.454	95.845
14	0.210	1.233	97.078
15	0.191	1.123	98.201
16	0.170	0.999	99.200
17	0.136	0.800	100.000

Table 2. Component score coefficient matrix.

	Component	
	1	2
1	0.084	-0.286
2	0.077	-0.005
3	0.082	-0.347
4	0.078	-0.300
5	0.077	-0.028
6	0.081	-0.303
7	0.073	0.032
8	0.078	0.194
9	0.082	0.182
10	0.074	0.443
11	0.074	0.391
12	0.074	0.249
13	0.068	0.241
14	0.076	-0.095
15	0.079	-0.189
16	0.074	-0.010
17	0.054	-0.056

large coefficient (0.521578). For mobile communication firms, quality refers to the quality of both core services and support services. Thus the firm should strengthen construction of wireless communication networks to improve core services quality, meanwhile improve support services such as services quality in branches, customer hotline and after service.

Price (0.332194) is an important factor for customers to make purchase decision. In order to promote customer equity, mobile communication firms should make rational pricing strategies to attract new customers and retain old customers.

Convenience (0.551596) influences brand utility most, which means mobile communication firms should make

Table 3. The result of logistic regression.

Variables	B	S.E.	Wald	Df	Sig.	Exp. (B)
F ₁	4.274	0.578	54.691	1	0.000	71.775
F ₂	-0.575	0.228	6.365	1	0.012	0.563
Constant	2.378	0.359	43.985	1	0.000	10.785

Table 4. The coefficients of sub-drivers.

Sub-driver	Coefficient
Quality	0.521578
Price	0.332194
Convenience	0.551596
Brand preference	0.504621
Advert publicity	0.345153
Corporate reputation	0.520810
Commonweal activity	0.291688
Loyalty program	0.220965
Preferential policy	0.245620
Customer's understanding of firm	0.059878
Firm's understanding of customer	0.090150
Special treatment	0.173050
Group activities	0.151427
Trust	0.377928
Word-of-mouth	0.444107
Cross-buying	0.322463
Brand inertia	0.260854

significant investment to reduce customers' transaction time and energy. Firms can improve convenience in three aspects. First, improve the construction of branches through their location, scale, environment and business hours, such as to shorten the time customers need to arrive at the branch and wait and increase information desks in crowd branches etc. Second, improve the quality of services such as to shorten the service time for each customer and strengthen the training of staff, as well as simplify business process etc. Finally, firms can use network technology or cooperate with banks to carry out business, such as online payment, online business operations, phone bank service.

Promotion strategies for brand driver

Brand driver includes brand preference, advert publicity, corporate reputation and commonweal activity, and their coefficients are 0.504621, 0.345153, 0.520810 and 0.291688 respectively. We can see the coefficient of corporate reputation is the largest, brand preference second.

Brand preference (0.504621) is an significant sub-driver which is the result of consumers' recognition of

brand image and spirit. In order to improve brand preference, developing those brands corresponding with customer's characteristics, consumption capacity and status is the most important. For example, M-zone of China Mobile captures the fashionable and personalized feature of young people and wins their preference. Therefore, mobile communication firms should develop brand spirit and brand personality according to the characteristics of different customer groups to win customers' recognition as great as possible, and then to promote customer equity.

Advert publicity (0.345153) also impacts brand utility a lot, and finally the purchase intention of customer. Mobile communication firms should consequently apply advertisement to induce positive consumption. They can also publicize themselves through some low cost ways, such as short message, cooperating with telephone suppliers. Coefficient of corporate reputation (0.520810) is the largest among the brand sub-drivers, indicating the importance to set up a good reputation, which needs the firm to maintain good performance in a long time (including service quality, financial position, contract commitment, social morality and business ethics etc.) (Edmund and John, 1998) Thus mobile communication firms should make effective management of factors that

may influence reputation through reputation management system (Hutton, 2001).

Commonweal activity (0.291688) has a relatively small coefficient, but its impact cannot be ignored. Those firms which participate in social welfare activities such as providing sponsorship to Hope Project and Charities Aid Foundation, are commonly loved and supported by customers. Thus the mobile communication firms could invest in commonweal activities appropriately.

Promotion strategies for relationship driver

Relationship driver includes loyalty program, preferential policy, special treatment, group activity, customers understanding of firm, firms understanding of customer and customer's trust of firm. Their coefficients are 0.220965, 0.245620, 0.059878, 0.090150, 0.173050, 0.151427 and 0.377928 respectively.

Both of loyalty program and preferential policy have no too large coefficients among relationship drivers, but this can not indicate that they are not important. In this survey, some customers are fond of the loyalty program and preferential policy, while most customers know nothing about these policies. Another some customers think procedures of these policies are not convenient, such as exchanging credit for gifts. Thus firms should notice to send related information to customers and simplify the procedures.

Customer's understanding of firm (0.059878) has the smallest coefficient, suggesting that it impacts customer equity least. Although customers want to know more and more about firms along with more and more purchase, for mobile communication firms, their customers are not interested in visiting and knowing the firm. Mobile communication firms could reduce investment in this area.

Coefficient of firm's understanding of customer (0.090150) is also very small. Firm's understanding of customer makes the customer feel he/she is important and enhances his/her favor to the firm. But for mobile communication firm, this point is not important. In the market of mobile communication, customers do not care whether the firm knows about them nor consider this aspect. So firms can reduce investment appropriately in this area too.

The coefficient of special treatment (0.173050) is comparatively small because it is mainly designed for the high-end customers, leading a limited effect on the overall. But special treatment is an effective way to enhance customer loyalty of high-end customers, and then customer equity. For instance, China Unicom establishes "Unicom Horizon Green Channel" in airport and railway station in major cities to make customers enjoy special service and discount. This measure attracts many customers who travel a lot to choose China Unicom, despite of their un-satisfaction with the weak signal.

Group activity (0.151427) also has limited impact on

customer equity. During our survey, it was found that many customers are not very interested in these activities. Thus mobile communication firms can be suggested to integrate the resources on group activity to special customer groups, for example, holding games in schools or sponsoring college activities, which could acquire good effects with low cost.

Coefficient of customer's trust of firm (0.377928) is the largest among relation sub-drivers, indicating that trust is an important sub-driver. For customer trust is generated from customer satisfaction, mobile communication firms should make more effort to enhance trust by improving customer satisfaction and avoid anything that may be harmful to it.

Promotion strategies for perception driver

Perception driver includes word-of-mouth and cross-buying; their coefficients are 0.444107 and 0.322463.

Word-of-mouth (0.444107) has great impact on customers' purchase decision; this is because in mobile communication market, customers believe others' consumption experience very much. Since there are positive and negative situations of word-of-mouth, mobile communication firms should make effort to generate positive word-of-mouth. On one hand, firms should try to give nice experience to customer through the action of value driver, brand driver and relationship driver. In this way, customer will give high evaluation to the firm and send positive word-of-mouth to others. On the other hand, firms should try to avoid negative word-of-mouth. Once negative word-of-mouth happens, measures should be taken promptly to compensate.

The coefficient of cross-buying (0.322463) is large, though it is lower than that of word-of-mouth. Customers' nice experiences are co-created by value drivers, brand drivers and relationship drivers. Thus, firms should try to raise customers' satisfaction through value drivers, brand drivers and relationship drivers to induce customers to make cross-buying. Meanwhile, in mobile communication market, cross-buying mostly occurs on additional services or support services of the services being used, so firms should emphasize the related support services and additional services to expand the cross-buying.

CONCLUSIONS AND RECOMMENDATIONS

This paper combined qualitative analysis with quantitative analysis to connect measurement model and promotion strategies of customer equity, and then proposed a series of suggestions and strategies to promote the customer equity of mobile communication firms in general.

In this study, we determined the influence coefficients of each sub-driver of customer equity based on the measurement model with four-dimensional drivers. The results showed that, for mobile communication firms, coefficients of value driver were the largest among the

four drivers of customer equity, indicating that what customers most cared about is just the delivered value firms provided to them, which was consistent with reality. Among all sub-drivers, the coefficients of convenience, quality, corporate reputation and brand preference were the biggest, and the firm should pay more attention and marketing resource to these aspects: to decrease transaction time; improve connection quality and the quality of relevant support services; build a good reputation; enhance brand personality and concept. Simultaneously, the coefficients of customer's understanding of firm, firms understanding of customer, group activities and special treatment were smaller. But we could not ignore them. Firms could appropriately reduce investment on them compared with other sub-drivers. In addition, the coefficients of cross-buying and word-of-mouth were large, indicating that they have significant influence on customer equity and providing support to add perception driver into the measurement model. This paper solved the problem to a certain extent that there was only qualitative analysis but no data support of the management and promotion of customer equity in traditional researches. This study also provided a new idea and reference value for further research on customer equity management and promotion.

However, there were several limitations in this study. Firstly, mobile communication firms were the research objects in this paper, causing that our results were closely based on the features of the market and customers of this industry. So, there may be limitations when expand our results to other industries or areas. If this happens, specific circumstances should be considered. Secondly, the weight coefficients figured out in the paper showed how important these sub-drivers were, but this just was a comparison among these sub-drivers and these numbers had no practical meaning. Thirdly, this research did not involve the quantification of customer equity for the limited length, but measurement is the basis and premise of promotion. Only after the estimation of the value of customer equity before and after the promotion strategies were taken, the effect of promotion could be judged, and then the marketing methods and investment direction could be adjusted. The author's other papers can be referred to learn measuring methods of customer equity (Shao, 2008).

This study applied the measurement model with four-dimensional drivers to customer equity promotion in mobile communication firms, and directed firm's marketing investment to some extent. Researches could be expanded in other fields to discuss the applicability of this model in customer equity promotion in future. Moreover, this paper researched on the customer equity promotion without considering customer background, customer revenue and customer education and so on, which should be considered when managing and promoting customer equity. And these considerations should be based on measuring the lifetime value of a single customer. Through the measurement of customer lifetime value, the

relationship between customer feature information and lifetime value could be established and customers could be classified, and then various strategies and methods could be taken aiming at different customer groups. Thus further research could be developed in this area.

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Full Length Research Paper

Information technology and total factor productivity

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This paper employs the manufacturing firm-level data of Taiwan to explore the issue of whether information technology investment brings about the Solow productivity paradox. In order to take into account the improvement of product quality caused by information technology investment, a hedonic price index is used to deflate the information technology variable. Besides the general specification of Cobb-Douglas production function, this paper considers the impact of information technology on total factor productivity, capital and labor productivity through substitution by applying a non-neutral production function.

Key words: Information technology, total factor productivity, hedonic price index.

INTRODUCTION

The progression of information technology (IT) has brought about the so-called third industrial revolution for the world's population. With the application of Internet and e-commerce, the function and efficiency of IT have diffused rapidly. In the past two decades, most industrial countries have invested a huge amount into IT in order to create, accumulate, store, and transfer knowledge, and also to improve competition and profit. For example, the share of IT in a firm's total investment in equipment has jumped from 7% in 1970 to 40% in 1996 (Economist, 1996). Jorgenson (2001) found that the decline in IT price provides enterprises powerful economic incentives for the substitution of IT investment for other forms of inputs. According to OECD (2008), the IT spending of the whole world in 2007 reached US\$ 1,473 billion.

Taiwan plays a key position in the production and manufacturing of IT equipment for the world. Taiwan has an important role in producing IT-related equipment such as that in the semiconductor, computer, and telecommunications fields. In addition to the IT manufacturing industry, other industries in Taiwan have also made massive investment in IT so as to face the competition in this age of the knowledge-based economy.

According to the survey that was conducted by the electronic data-processing center of the Directorate General of Budget, Accounting and Statistics (DGBAS), the IT expenditure rose from NT\$ 165 billion in 2005 to NT\$ 193 billion in 2007.

Some economists have discovered that the IT revolution does not necessarily result in productivity growth. They also point out that the increase in IT investment does not necessarily help to promote productivity. Solow (1987) called this phenomenon the "Productivity Paradox". The studies of Berndt and Morrison (1995) and Loveman (1994) displayed the phenomenon of the productivity paradox. However, the empirical studies of later scholars present entirely different conclusions. Brynjolfsson and Hitt (1996), Gunasekaran and Nathb (1997), Barua and Lee (1997), Dewan and Min (1997), Lehr and Lichtenberg (1998), Stiroh (1998), Gera et al. (1999), Thatcher and Oliver (2001), and Jorgenson (2001) all showed that firms investing into IT will not bring about the phenomenon of productivity paradox. Therefore, opinions of productivity paradox are mixed among those in the literatures above.

The Solow productivity paradox: what do computers do to productivity? Asking the question of why TFP is not an increasing function of IT. As Triplett (1999) states that "Growth accounting answers the question: Why is growth not higher?" The paradox says: "Why is productivity not higher?" This implies that some papers use growth accounting method to compute the IT's contribution to

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growth not to TFP. Furthermore, intensive use of computer is likely to raise the labor and nonIT capital productivity through input substitution. In Dewan and Mins' (1997) empirical findings, IT capital is a net substitute for both ordinary capital and labor. Stiroh (1998) also finds that noncomputer input growth decrease as the use of computer capital services increased in these computer intensive sectors, and cheap computers substituted for other inputs, including labor. Therefore, a suitable production function is needed to answer the Solow productivity paradox.

Besides incorrect methodologies and measurement errors, some economists have tried to find out the rational explanations for these mixed empirical findings. Thatcher and Oliver (2001) suggested that these mixed empirical findings might result from incorrect methodology, data error, but not reflect the real IT contribution, especially from the ability of IT to improve product quality indicated that quality improvements are realized when a technology investment leads to the creation of new products, new features, or existing products, which directly increase human desire to consume those products. Furthermore, Chun and Nadiri (2002) mentioned that productivity growth could take place in the improvement of output quality (product innovation). In particular, improvement in output quality is one of the most prevailing characteristics in the IT production such as microprocessor speed, the capacity of storage devices and memory, etc. Hence, IT plays an important role in improving and promoting product and service quality.

According to the studies of Brynjolfsson and Hitt (1996) and Lehr and Lichtenberg (1998), personal computer and terminal equipment can be defined as the IT investment variable. Due to the findings from Dewan and Mins' (1997) and Stiroh (1998), except the general specification of Cobb-Douglas production function, this paper considers the impact of IT on TFP, capital and labor productivity through substitution by applying a non-neutral production function to construct an empirical model and appraise the impact of IT on productivity and the phenomenon of the productivity paradox. Therefore, the end result of this on production is a non-neutral shift in the observed output. Not only will the productivity of inputs change, but also, the marginal rate of technical substitution (Huang and Liu, 1994).

In order to take into account the improvement of product quality caused by IT investment, this paper not only uses firm-level data to reflect the impact of IT on product quality (Hitt and Brynjolfsson, 1996), but also adopts a deflator to deflate IT variables. The quality-adjusted price index used in the paper is a computer hedonic price index. Thus, people can be free from the problem of too much deflation due to deflate the PC related variables, and turn IT variables from nominal terms to real terms. The computer hedonic price index adopted by this paper considers the character variables of quality, such as brand, CPU, screen, memory, hard drive, and time dummy variables, etc. Furthermore, the computer hedonic price index

index is estimated by the hedonic regression method to reflect the improvement of output quality.

EMPIRICAL FRAMEWORK AND MEASUREMENT OF TFP

Although the empirical models of existing literature have different samples and periods, most of them (Loveman, 1994; Berndt and Morrison, 1995; Hitt and Brynjolfsson, 1996; Lehr and Lichtenberg, 1998; Gera et al., 1999) adopt the Cobb-Douglas production function as an empirical model. Hence, the study applies the Cobb-Douglas production function as the basic model. This paper assumes that the production function can be approximated by a Cobb-Douglas function:

$$Y_i = A \cdot NONIT_i^\alpha LAB_i^\beta IT_i^\gamma e^{\varepsilon_i}, \quad (1)$$

Where Y is value added, $nonIT$, LAB , and IT are the non-IT physical capital, labor input, and IT capital, respectively. The subscripts i refer to firm i , and ε is the error term reflecting the effect of unknown factors and other disturbances.

The study can take the logarithms of Equation (1) and obtain a linear regression in order to implement the estimation of the Cobb-Douglas function as shown thus:

$$y_i = a + \alpha nonit_i + \beta lab_i + \gamma it_i + \varepsilon_i, \quad (2)$$

Where the lower-case letters denote the logarithms of the variables, and α , β and especially γ (the elasticities of value added with respect to IT capital) are the parameters in which we are particularly interested.

We can use the results of Equation (2) to verify and compare with the results of Brynjolfsson and Hitt (1996), Hitt and Brynjolfsson (1996) and Dewan and Min (1997), whether marginal product (MP) could be a proper productivity indicator of the contribution of IT to output.

This paper uses the estimated coefficients of Equation (2) to calculate MP in the following way:

$$MP_i = \frac{\partial Y}{\partial X_i} = \frac{\partial Y}{\partial X_i} \frac{X_i \cdot Y}{Y \cdot X_i} = \delta_i \frac{Y}{X_i}, \quad (3)$$

Where X_i through X_n are the variables that measure $NONIT$, LAB and IT , and δ_i is the output elasticity of X_i . The MP of X_i (MP_i) is simply the elasticity multiplied by the ratio of output to X_i input as shown in Equation (3).

Owing to the Solow productivity paradox: what do computers do to productivity? that asks the question of why TFP is not an increasing function of IT, therefore, Triplett (1999) states that "Growth accounting answers the question: Why is growth not higher?" The paradox says: "Why is productivity not higher?" This implies that some papers use growth accounting method to compute the IT contribution to growth but not to TFP. Most analyses are based on Equation (1):

$$Y = F(NONIT, LAB, IT), \quad (4)$$

Taking the total differential, we have:

$$dY = F_N dNONIT + F_L dLAB + F_I dIT, \quad (5)$$

Where the F_i are the MP of $NONIT$, LAB and IT , respectively. And the growth accounting identity becomes:

$$\frac{dY}{Y} = \frac{NONIT \cdot F_N}{Y} \cdot \frac{dNONIT}{NONIT} + \frac{LAB \cdot F_L}{Y} \cdot \frac{dLAB}{LAB} + \frac{IT \cdot F_I}{Y} \cdot \frac{dIT}{IT} \quad (6)$$

The problem with this type of analysis is that the production function does not measure the TFP, and its decompositions, dY and dY/Y , do not indicate the change of TFP.

The Solow paradox asks the question of why TFP is not an increasing function of IT. Furthermore, intensive use of computer is likely to raise the labor and nonIT capital productivity through input

$$y_i = a + \gamma it_i + \alpha_1 nonit_i + \alpha_2 IT \cdot nonit_i + \beta_1 lab_i + \beta_2 IT \cdot lab_i + \lambda_1 tfp + \lambda_2 IT \cdot tfp + \varepsilon_i, \quad (9)$$

Where the lower-case letters denote the logarithms of the variables, and the TFP index is measured using the approach initially proposed by Solow (1957) and also adopted by Jefferson et al. (2000) and Huang (2004). This paper estimates the TFP index in the following steps from Equations (10) to (13):

$$Y_i = A \left(\prod_{j=1}^2 X_{ij}^{\theta_j} \right) \varepsilon_i \quad (10)$$

$$\theta_j = \frac{\phi_j}{\sum_{j=2}^2 \phi_j} \quad (11)$$

$$u_i = \log Y_i - \sum_{j=1}^2 \theta_j \log X_{ij} \quad (12)$$

$$TFP_i = \exp(u_i - u_{\max}) \quad (13)$$

Where Y is value added, and X is the vector of input, including capital and labor for each firm in Equation (10), ϕ is the output elasticity of input, θ in Equation (11) is the weight measuring factor share to calculate the composite Cobb-Douglas index of TFP. Equations (12) and (13) are used to calculate TFP of each firm in this specific year. Equation (9) will be explored in this paper, and the general specification of Equation (2) will also be discussed in our study for the purpose comparison.

Finally, in order to measure the magnitude of IT contribution to TFP, the study then evaluates the output elasticity of IT and TFP, respectively to get the estimation by the following definition:

$$\frac{\partial y_i}{\partial it} / \frac{\partial y_i}{\partial tfp} = \frac{\partial tfp}{\partial it} \quad (14)$$

Data sources and definitions of variables

The source of sample data is the manufacturing sampling survey

substitution as shown in the empirical finding of Dewan and Mins (1997) and Stiroh (1998).

Therefore, one suitable reformulation of the non-neutral production function is:

$$Y = F(g(IT)NONIT, h(IT)LAB, IT) \cdot TFP(IT), \quad (7)$$

Where $g(\cdot)$, $h(\cdot)$ and $TFP(\cdot)$ are function of IT. The reformulation of the non-neutral production function gives rise to the following equation:

$$Y_i = AIT_i^\gamma NONIT_i^{\alpha_1 + \alpha_2 IT_i} LAB_i^{\beta_1 + \beta_2 IT_i} TFP_i^{\lambda_1 + \lambda_2 IT_i} e^{\varepsilon_i} \quad (8)$$

By taking the logarithms of Equation (8), the study obtain Equation (9), which can be used to implement the relationship between IT and TFP, and IT and other traditional inputs:

data from the industry, commerce, and service census of Taiwan in 1991 with 1,174 samples of firm-level data.

In Equation (1) of this paper, due to the absence of certain materials in the model, the study uses value-added (VAL) as the proxy for the dependent variable. According to the MOEA's (Department of Statistics, Ministry of Economic Affairs) definition, we measure VAL based on the following specification: (VAL) is equal to total output sales less intermediate inputs. Total output sales are deflated using a wholesale price index and intermediate inputs are deflated using a price index of intermediate inputs. With respect to the explained variables of the right-hand side equation, non-IT capital ($NONIT$) is obtained by subtracting the IT capital from the fixed capital and subtracts accumulated depreciation. We use a capital price index to adjust for inflation, while labor (LAB) refers to the number of employees.

According to the search of Hitt and Brynjolfsson (1996) and Lehr and Lichtenberg (1998), PCs and terminals can be defined as IT investment (IT) items. In order to take the improvement of product quality caused by IT investment into account, we use firm-level data, and adopt a proper computer hedonic price index to deflate personal computers. In other words, the qualitative data on IT capital is adjusted through price and then deflated by the computer hedonic price index for empirical study. In accordance with Hitt and Brynjolfsson (1996), when an increase in product variety and quality is properly counted as part of the value of output, the contribution to output will then not be underestimated. Table 1 provides sample statistics for our key variables.

EMPIRICAL RESULTS

The previous Equation (2) is regarded as the starting point of the analysis. The OLS estimates coefficients are shown in Table 2. Table 2 shows that the labor coefficient is higher than the capital coefficient, although, both have a significant impact on the level of productivity. The IT capital's parameter (γ) is significantly positive at the 1% statistical level; however, its impact on output is smaller than $NONIT$ and LAB . Then, the study estimate MP of each input follow the method provided by Brynjolfsson and Hitt (1996) as specified in Equation (3) to verify and compare with the results of Brynjolfsson and Hitt (1996),

Table 1. Statistics on variables (after deflation) (NT\$ million).

Variable	Name	Mean (S.E.)
Value added	VAL	992.416 (6406.222)
Non-IT capital	NONIT	162.821(1,791.495)
Number of employees	LAB	554.064 (1,617.800)
IT capital	IT	2.234(6.173)
TFP index	TFP	0.038 (0.039)

The numbers in parentheses are standard errors.

Table 2. Estimates of the Cobb-Douglas production function.

Variable	Parameter estimate	Standard error
constant	7.131 ^a	0.281
log NONIT	0.387 ^a	0.017
log LAB	0.545 ^a	0.027
log IT	0.126 ^a	0.020

a, b, and c represent the 1, 5, and 10% significance levels, respectively. $R^2=0.841$.

Hitt and Brynjolfsson (1996) and Dewan and Min (1997). The results show that MP of each input presents the $MP_{IT} > MP_{NONIT} > MP_{LAB}$ pattern. This estimate pattern is somewhat different from the empirical results in Brynjolfsson and Hitt (1996), Hitt and Brynjolfsson (1996), and Dewan and Min (1997), which have $MP_{LAB} > MP_{IT} > MP_{NONIT}$ pattern. All these studies reflect a contradiction between the magnitude of output elasticity and MP of IT even smaller than labor, although, its MP is larger than non-IT capital. Owing to the fact the small share of IT to output, by applying Equation (3), the estimation of MP would be larger. This implies that MP could not be a proper productivity indicator, and MP is not the same as TFP. Thus, it could not be used to explicitly evaluate productivity paradox.

Therefore, this paper adopts the non-neutral production function as our primary empirical model to detect productivity paradox, and also takes into account the impact of IT on TFP, capital and labor productivity through substitution.

In order to observe whether or not IT has an influence on productivity, we use the F-test to test the joint null hypothesis for the parameters in this non-neutral production function model as shown in Equation (9). The joint null hypothesis is $H_0: \alpha_2 = \beta_2 = \gamma_2 = 0$, and the alternative hypothesis is $H_1: \alpha_2 \neq 0, \beta_2 \neq 0, \text{ or } \gamma_2 \neq 0$, or all are nonzero. Since $F = 6.31$ and the P-value < 0.01 , the study rejects H_0 and conclude that at least one parameter is not zero, and thus, IT has an effect upon productivity via TFP or other traditional inputs.

Table 3 presents the estimates for the non-neutral production function. The result shows that the coefficient of IT ($logIT$) is 0.370 and positive significance at the 1%

statistical level, and the estimated IT contribution to output is more than the Cobb-Douglas functional form. We also find that the interaction terms of IT and non-IT capital, IT and labor, and IT and TFP have statistically significant impacts on productivity. Moreover, the coefficient for the interaction effect between IT and non-IT capital is negative, implying that IT and non-IT capital are substitute in the period of the study. It can be inferred that IT price changes will cause the flow of the input to substitute for other mutually. This is consistent with the finding of Jorgenson (2001) that discovered U.S. IT price decline, triggered by a much sharper acceleration in the price of semiconductors, and found that the rapid price decline for computer investment was 17.1% per year from 1959 to 1995, and since 1995, this decline has almost doubled to 32.1%. His studies show that the price decline of IT investment makes the accelerated accumulation in IT investment for other inputs, and has significant impact on GDP growth.

Besides, the coefficients for the interaction effect between IT and Labor, and IT and TFP have positive and significant impacts on output, this implies that IT and Labor, and IT and TFP have complementary relationships. With this relationship, IT can enhance TFP and then promote productivity, and it can be used to detect the Solow productivity paradox. It can be concluded that, there is no Solow productivity paradox in the study period.

Finally, this paper applies Equation (14) to measure the contribution of IT to TFP, and the result of estimation shows that IT has important positive and significant impacts on TFP of the magnitude approximate 15%. This result could further demonstrate the conclusion of the Solow productivity paradox earlier drawn in this paper.

Table 3. Estimates of the non-neutral production function .

Variable	Parameter estimate	Standard error
constant	4.250 ^a	0.045
logIT	0.370 ^a	0.135
log NONIT	0.236 ^a	0.005
ITlogNONIT	-0.030 ^a	0.006
logLAB	0.728 ^a	0.003
ITlogLAB	0.019 ^a	0.005
logTFP	1.366 ^a	0.012
ITlogTFP	0.229 ^a	0.079

a, b, and c represent the 1, 5, and 10% significance levels, respectively. $R^2=0.930$.

Conclusions

Over the past decade, quite a few studies have discussed and debated the issue of the Solow IT productivity paradox. Nevertheless, few of them focus on the impact of IT on TFP. Some of these studies applied the Cobb-Douglas production function to estimate the MP of IT, and use it as the IT's contribution to productivity. For this reason, this study uses the manufacturing firm-level data of Taiwan in 1991 to explore the issue of whether IT investment brings about the Solow productivity paradox. In order to take the improvement of product quality caused by IT investment into account, a proper hedonic price index is used to deflate the IT variable. Besides the general specification of Cobb-Douglas production function, this paper considers the impact of IT on TFP, capital and labor productivity through substitution by applying a non-neutral production function. Further we evaluate the contribution of IT to TFP.

Empirical results show that that MP could not be a proper productivity indicator, and MP is not the same as TFP. Thus, it could not explicitly evaluate Solow IT productivity paradox. Furthermore, IT investment provides a significant contribution to productivity. The study also finds that IT capital is a complement for TFP and a substitute for non-IT capital. This implies that the price of IT declining would make the accelerated accumulation in IT investment for traditional inputs. With the significant and positive impact of IT on TFP, we conclude that there is no productivity paradox in our study.

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Full Length Research Paper

Organizational culture and knowledge sharing: Empirical evidence from service organizations

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This paper aims to investigate the relationship between organizational cultural elements and knowledge sharing. This is a quantitative research by nature. A questionnaire is derived from previous studies. The survey covered seven service organizations in Bangladesh. Regression was adopted to test hypotheses. Out of the four independent variables, trust, communication between staff, and leadership were found to have a positive and significant relationship with knowledge sharing. A surprising finding of this study is that reward system does not have any impact on knowledge sharing. It is reasonable here to conclude that knowledge sharing can be successful in the service industry in Bangladesh with given emphasis on trust, communication between staff and leadership.

Key words: Service organizations, knowledge sharing, cultural elements.

INTRODUCTION

In today's economy, knowledge is considered to be the most strategically important resource (Conner and Prahalad, 1996; Grant, 1996; Nahapiet and Ghoshal, 1998; Pettigrew and Whipp, 1993). The effective management of this resource is, therefore, one of the most important challenges facing today's organizations (Davenport and Prusak, 1998; Drucker, 1993; Hansen, Nohria, and Tierney, 1999). The sharing of knowledge between employees and departments in the organization is necessary to transfer individual and group knowledge into organizational knowledge, which leads to effective management of knowledge. Some researchers found that knowledge sharing is critical to a firm's success (Davenport and Prusak, 1998) as it leads to faster knowledge deployment to portions of the organization that can greatly benefit from it (Syed-Ikhsan and Rowland, 2004). When individuals share organizationally relevant experiences and information with one another, it significantly increases the resources of an organization and decreases time wasted in trial-and error (Lin, 2007).

On the other hand, the unwillingness of knowledge sharing causes fatalities for organizational survival (Lin, 2007). Therefore, determining which factors contribute to effective knowledge sharing in an organization constitutes an important area of research (Hooff and Ridder, 2004).

In Bangladeshi economy, the major contributors to GDP are agriculture, industry and services. During the period from 1949-1950, agriculture contributed to 70% of GDP whereas the contribution by the service sector was only 26% (Nahar, 2009). However, changes have come over the years and during 2007-08, the contribution of the service sector to GDP was 49.46%, which is a significantly higher figure compared to the contribution of both agricultural GDP (20.87%) and industrial GDP (29.66%) (The financial express, 2008). More than a quarter of the domestic labor force is employed by the service organizations in Bangladesh (Raihan, 2005). The GDP employment ratio for service sector was USD 1,312.09 per employee per annum in 2000, making the sector a more vital player in creation of employment than manufacturing and agricultural sectors (Raihan, 2005). In Bangladesh economy, the service sector itself is a major user of services as inputs (Azad, 1999). Housing, electricity-gas, public administration, banking and

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insurance services are the big users of services per unit of output. Service industry in Bangladesh is more knowledge intensive compared to other industries. Although manufacturing and services have specific features related to the inputs into the production process, the nature of the process itself and the resulting output demands are more knowledge intensive for services (Islam, Ahmad, and Mahtab, 2010). In manufacturing the output is tangible, consumer's participation in manufacturing process is limited, and time lags between production and consumption are lengthy (Islam et al., 2010). Whereas in service industries the output is intangible, consumers often participate actively in the service delivery process and a high degree of simultaneity in production and consumption that requires service providers to be more creative (Gaither and Frazier, 2001). In this situation, individual and organizational knowledge plays a crucial role. In today's global competition, the firms in all industries including the service industries face steep competition from multinational companies which offer services that not only satisfy the needs of clients but also add an increased value (Islam, Doshi, Mahtab, and Ahmad, 2009). This strategic reorientation with importance put on innovativeness and uniqueness (Kumpe and Bolwijn, 1994), requires service organizations to constantly offer new services and this task is impossible to accomplish without sharing necessary knowledge among different functions of an organization. In this regard, organizational culture plays an important role to facilitate sharing of knowledge in an organization. Past studies have shown that cultural elements are related to successful knowledge sharing in developed and developing countries (Issa and Hadda, 2008; Al-Alawi et al., 2007; Kerr and Clegg, 2007; Oliver and Kandadi, 2006) but there is a lack of evidence from the underdeveloped countries. On this background, this research aims to investigate the relationship between the cultural elements and knowledge sharing in Bangladesh service organizations.

LITERATURE REVIEW

Defining knowledge and knowledge sharing

"Knowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provide a framework for evaluating and incorporating new experiences and information" (Davenport and Prusak, 1998). Some authors define knowledge as a state of knowing that constitutes facts, concepts, principles, laws, casual relationships, insights, judgments, intuition, and feelings (Ahmad and Daghfous, 2010). Due to globalization and technological challenges, now-a-days companies feel the need to pay greater attention to the development and preservation of internal skills and

capabilities (Lopez, Peon and Ordas, 2004), which means in order to remain competitive, companies not only require to preserve knowledge but also share knowledge between individuals and functional groups. Sharing of knowledge can be defined as the dissemination of information and knowledge throughout the organization (Ling, Sandhu and Jain, 2009). Knowledge sharing plays an essential role in the organizational process because it helps an organization to transfer new ideas or solutions (Islam et al., 2010). When employees are interacting among one another for idea generation, it promotes the sharing of knowledge among them. Knowledge sharing enables the flow of knowledge among and between individuals, groups and organizations (Gee-Woo and Kim, 2002; Huang and Newell, 2003). In the literature, knowledge sharing is used in two ways. Some authors consider knowledge sharing as part of exploitation (McElroy, 2003) and others consider it as part of the exploration phase (Swan, Newell, Scarbrough and Hislop, 1999). Exploitation refers to the process where existing knowledge is captured, transferred and used in other similar situations. Exploration, on the other hand, involves processes where knowledge is shared, synthesized and new knowledge is created (McElroy, 2003). Bakker, Leendes, Gabby, Krazer, and Engelen (2006), are of the opinion that there is a difference between knowledge sharing as part of knowledge exploration (production) and knowledge sharing as part of knowledge exploitation (integration). Knowledge sharing in order to integrate knowledge takes place from one individual to many others at once ("broadcasting"). On the other hand, knowledge sharing as part of knowledge production takes place more in the form of group discussions, working together to solve a problem: employees define the problem together, shares their views and opinions, share information to find a solution together (Bakker et al., 2006). Since the authors of the present study are not only interested in knowledge integration, but also knowledge sharing that is facilitated by trust among the group members, open communication between staff, reward system, and influence of leaders, this paper considers knowledge as both part of knowledge integration process and part of the knowledge production process.

Cultural elements and knowledge sharing

Organizational culture can be defined as the shared, basic assumptions that an organization learnt while coping with the environment and solving problems of external adaptation and internal integration that are taught to new employees as the correct way to solve those problems (Park, Ribiere and Schulte, 2004). An organizational culture that supports knowledge sharing can lead to more effective achievement because instilling a culture of standardizing and maintaining information is

critical to achievement (Lai and Lee, 2007; McManus and Loughridge, 2002).

Each organization has its own culture, which gradually develops overtime to reflect the organization's identity in two dimensions: visible and invisible (Al-Alawi et al., 2007). The visible dimension of culture is reflected in the espoused values, philosophy and mission of the firm while the invisible dimension lies in the unspoken set of values that guides employees' actions and perceptions in the organization (McDermott and O'Dell, 2001). Al-Alawi et al (2007), found that cultural elements such as trust between co-workers, communication, reward system, and organizational structure are positively related to knowledge sharing in organizations. Issa and Haddad (2008), also found that trust among co-workers is an important cultural element for successful knowledge management. Employees are willing to share knowledge in situations where they can trust the recipient of this knowledge (Connelly and Kelloway, 2002). Some other cultural elements, such as, leadership, organizational, and individual factors are also essential for successful knowledge sharing (Kerr and Clegg, 2007). Previous studies found that leadership and reward system have positive impact on knowledge sharing (Oliver and Kandadi, 2006). In the light of the aforementioned discussion, it is reflected that past researches revealed that cultural elements enhance knowledge sharing. Since we are also interested to evaluate how the cultural elements – trust, communication among staff, leadership, and reward system are related to successful knowledge sharing, based on past studies, the following section highlights how some of these cultural elements are contributing to sharing of knowledge.

Trust

Trust is "a set of beliefs about the other party (trustee), which leads one (trustor) to believe that the trustee's actions will have positive consequences for the trustor's self" (Bakker et al., 2006). Trust is a multidimensional construct which express with the belief, sentiment or expectation about an exchange partner that results from the partner's expertise, reliability and intentionality or from the partner's honesty and benevolence (Cheng, Yeh and Tu, 2008; Claro, de Oliveira and Hagelaar, 2006; Ganesan, 1994; Kumar, Scheer and Steenkamp, 1995). Various past studies found that trust between co-workers is an extremely essential attribute in organizational culture, which is believed to have strong influence over knowledge sharing (Al-Alawi et al., 2007; Andrews and Delahay, 2000). Many researchers believe that when people trust each other, they are more willing to provide useful knowledge (Bakker et al., 2006). When trust exists, people are more willing to listen and absorb each other's knowledge (Andrews and Delahay, 2000; Levin, 1999;

Mayer, Davis and Schoorman, 1995; Tsai and Ghoshal, 1998). On the other hand, Connelly and Kelloway (2002) noted that employee would only be interested to share knowledge in situations where they trusted the recipient of this knowledge. Other researchers such as Davenport and Prusak (2000), found that if distrust is present within an organization, knowledge management cannot, and will not, succeed because when fear is present, people will not contribute in sharing critical information and will be suspicious regarding their organization's true intentions. Contrary to other researches, Bakker et al. (2006), who believed that trust among people is important for successful knowledge sharing. However, Issa and Haddad (2008) revealed in a recent study that mutual trust among employees is needed in order for knowledge to flow freely with a company. They opined that companies should not forget that the most important asset that affects the sharing of knowledge is a trustful relationship that is directly affected by a proper organizational culture. De Long and Fahey (2000), also found in their work that the level of trust that exists between the organization, its subunits, and its co-workers greatly influences the amount of knowledge that flows both between individuals and from individuals into the organization's database, best practices archives and other records.

Communication (interaction among staff)

Communication refers to "human interactions through oral conversations and the use of body language while communicating. Interaction among the employees is facilitated by the existence of social networking in the organization" (Al-Alawi et al., 2007). Some of the previous studies show that communication contributes to knowledge sharing as it is related to trust in various inter-organizational relationships (Cheng, Yeh and Tu, 2008; Hendriks, 1999; Anderson and Narus, 1990; Cummings, 1984; Mohr and Spekman, 1994). Smith and Rupp (2002) also revealed that interaction between co-workers is fundamental in encouraging knowledge sharing. Similarly, Al-Alawi et al. (2007) found that communication among staff is positively related to knowledge sharing in organizations. Organizations that explicitly favor knowledge sharing and knowledge integrating into the organization encourage debate and dialogue in facilitating contributions from individuals at multiple levels of the organization (Davenport and Prusak, 1997). Such participation among employees is enabled by practices that involve individuals gathering data from diverse sources, exercising their judgment to transform data into information and then engaging in intense interaction to produce new knowledge that can be the basis for action (Lopez et al., 2004). Therefore, an organization that encourages open flow of information among employees can make knowledge sharing successful, create new

organizational knowledge and reduce the cost of trial-and-error.

Leadership

The term leadership refers to the process of influencing others towards achieving some desired goals (Jong and Hartog, 2007). The leaders act as role models for the manner in which knowledge sharing occurs, as well as, making the incentives for doing so (Kerr and Clegg, 2007). The leaders facilitate networks of knowledgeable employees of the organization and provide best practice of coordination and collaborative activities (Kerr and Clegg, 2007). Therefore, leaders play an important role in knowledge sharing because they facilitate other members to create the necessary knowledge locally (Kreiner, 2002). As Nonaka (1987) argues, managers need to orient chaos toward purposeful knowledge creation by proving “conceptual framework that helps employees make sense of their own experience” (Nonaka, 1987). Therefore, a leader is expected to provide guidance and translate business strategies (business knowledge) to his team. As Kerr and Clegg (2007), stated in their research that leadership is necessary in providing appropriate knowledge and network with and across boundaries, which impacts the opportunities to share knowledge. The importance of leadership in affecting knowledge culture in organizations is also supported by Oliver and Kandadi (2006). They are of the opinion that “senior management should be actively involved in the evangelization process and convey that knowledge creation and knowledge sharing is highly valued in organizations”. The results of their study highlights the essential role of middle and front level managers in developing a culture that will facilitate knowledge sharing through the manifestation of various leadership characteristics.

Reward system

An effective reward system is essential in order to motivate employees to share knowledge among themselves and between different departments because in the absence of proper motivation, some employees may be unwilling to share knowledge due to fear of loss as a result of this action. Oliver and Kandadi (2006) confirmed that organizational rewards motivate employees towards knowledge sharing and foster a knowledge culture. They opined that the respondents suggested that the indirect rewards such as appreciation and recognition play a greater role than the monetary incentives in knowledge sharing. Also, in promoting knowledge sharing culture, long-term rewards such as profit sharing and employee share options (ESOPs) was observed as effective means when compared to the short-term rewards.

Similarly, Cornelia and Kugel (2004) found that monetary rewards have an immediate effect on motivation to share knowledge. But in the long-term, people should be incentivized non-monetarily for sharing their knowledge. Other researchers also stress the importance of reward system in enhancing knowledge sharing (Davenport and Prusak, 2000; Gupta and Govindarajan, 2000). On the other hand Ling et al., (2009), revealed that the most effective method to promote knowledge sharing in the organization is to link it with rewards and performance appraisal. They believe that top management support is also vital to ensure the success of knowledge sharing in the organization. Contrary to other authors Ling et al. (2009), found that monetary reward is more effective than non-monetary reward in promoting knowledge sharing in the organization. Al-Alawi et al. (2007), also opined that managers (or leaders) must consider the importance of collaboration and sharing best practices when designing reward systems. The idea is to introduce and implement processes in which sharing knowledge and horizontal flow of information are encouraged and indeed rewarded. Such rewards should be based on group rather than individual contribution (Goh, 2002).

Research model

As is evident in the current literature, there is not only a dearth of knowledge sharing studies in Bangladesh service industry, but an absence of empirical research that investigated the role of cultural elements on knowledge sharing. Most of the literature of knowledge sharing argued that cultural elements play a vital role in fostering knowledge sharing. The main emphasis of this research is to bridge the gap in literature to explain how cultural elements encourage knowledge sharing in service organizations in Bangladesh. Knowledge sharing is the process in which a unit of an organization is impacted by the experience and the know-how of another unit (Ahmad and Daghfous, 2010). The extensive literature on knowledge sharing has proved significant evidence of the benefits of cultural elements in enhancing knowledge sharing (Issa and Hadda, 2008; Al-Alawi et al., 2007; Kerr and Clegg, 2007; and Oliver and Kandadi, 2006). The theoretical framework for this study is shown in Figure 1.

Hypotheses

Based on the relationship of the variables shown in the conceptual framework, the following research hypotheses have been developed. The central idea of this research is that cultural elements play an important role in knowledge sharing.

Organizational culture was seen in four main dimensions – trust among employees, communication

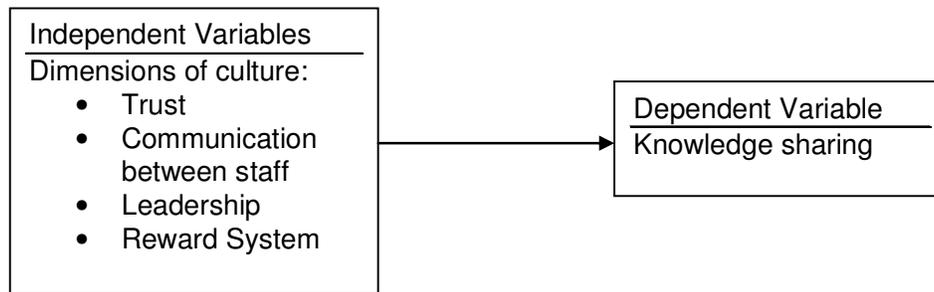


Figure 1. Theoretical framework.

between staff, leadership and reward system. De Long and Fahey (2000) revealed in a study that the level of trust that exists between the organization, its subunits, and its co-employees greatly influences the amount of knowledge that flows both between individuals and from individuals into the organization's database. Therefore, trust among employees is essential to improve the speed of knowledge sharing in organizations. Issa and Haddad (2008), also mentioned that trust is an important cultural element for the success of knowledge management because, if the recipient of knowledge is not persuaded that the source is trustworthy, it is not likely knowledge from that individual will be accepted. In another study, Connelly and Kelloway (2002) also found that people would only be willing to share knowledge in situations where they trust the recipient of knowledge. Other researchers also found that trust is related to free flow of knowledge among the co-workers. For example, Andrews and Delahay, 2000; Levin, 1999; Mayer et al., 1995; Tsai and Ghoshal, 1998 showed that when trust exists, people are more willing to gain and absorb each other's knowledge. Similarly, the findings of Al-Alawi et al. (2007) revealed that trust is positively related to knowledge sharing in organizations. Trust creates a trustworthy knowledge culture in organizations that improves knowledge sharing process. Therefore, it is hypothesized that:

H₁: There is a positive relationship between trust among co-workers and knowledge sharing.

Communication between co-workers is fundamental in encouraging knowledge sharing (Smith and Rupp, 2002). Organizations that encourage knowledge sharing and knowledge integrating into the organization creates a floor for open discussion and debate and this motivates individuals at various levels to freely give their opinions and views on different issues (Davenport and Prusak, 1997). Such participation among employees is enabled by practices that involve individuals gathering data from diverse groups, exercising their judgment to transform data into information and then engaging in intense

interaction and discourse to produce new knowledge (Lopez, Peon and Ordas, 2004). Therefore, an organization that encourages open discussion among employees can make knowledge sharing easy and successful, create new organizational knowledge and reduce the cost of trial-and-error. From the literature it is evident that the positive influence of communication enhancing knowledge sharing (Al-Alawi et al., 2007). Hence the second hypothesis:

H₂: There is a positive relationship between communications (interaction between staff) and knowledge sharing.

Oliver and Kandadi (2006), highlights the essential role of middle and front level managers in developing knowledge culture through the manifestation of various leadership characteristics. They opined that senior managers must be actively involved in the evangelization process and convey that knowledge sharing and creating organizational knowledge are highly valued in organizations. Leadership at all managerial levels is required to develop a desired culture (Kluge, Stein and Licht, 2001; Marsh and Satyadas, 2003; Welch and Welch, 2005), that will make knowledge transfer an ongoing process. Therefore, leaders play an important role in knowledge sharing because they facilitate co-workers to create necessary knowledge (Kreiner, 2002). As Kerr and Clegg (2007), stated in their research that leadership is crucial in providing appropriate knowledge and network with and across boundaries, which impacts the opportunities to share knowledge. Therefore, it is hypothesized that:

H₃: There is a positive relationship between leadership and knowledge sharing.

Reward system is a strong motivator for knowledge sharing (Syed -Ikhsan and Rowland, 2004). Oliver and Kandadi (2006), showed that organizational rewards motivate employees towards knowledge sharing and foster a knowledge culture. Similar results are also found by other researcher such as Davenport and Prusak, (2000) and Gupta and Govindarajan (2000). Oliver and

Table 1. Summary of reliability analysis.

Variable	Number of item	Cronbach's alpha
Trust	5	0.520
Communication	3	0.617
Leadership	6	0.851
Reward	3	0.600
Knowledge sharing	4	0.609

Kandadi (2006) also opined that the indirect rewards such as appreciation and recognition play a greater role than the monetary incentives in knowledge sharing. Al-Alawi et al. (2007) also found that there is positive relationship between rewards and knowledge sharing in organizations.

However, some employees may be unwilling to share knowledge due to fear of losing job or being replaced by another employee. Therefore, managers or leaders must consider the importance of collaboration and sharing best practices when designing reward systems (Al-Alawi et al., 2007). The idea is to introduce a reward system that will encourage co-workers to openly share knowledge in order to achieve greater effectiveness. Therefore, it is hypothesized that:

H₄: There is a positive relationship between the reward system and knowledge sharing.

METHODOLOGY

The research strategy adopted in this study was deductive in nature. By reviewing the relevant literature, the tentative theory was first derived. The hypotheses are then deduced and tested from the data collection through questionnaire survey. A structured survey questionnaire was administered to employees, mainly the CEO, top level managers, mid-level managers, and lower level managers who are the key decision-makers with regards to sharing of knowledge in the organizations. Questionnaires were distributed in seven service organizations in Bangladesh and in total one hundred and twenty nine were returned and used for data analysis. A five-point Likert scale was used for questionnaire design. Items of the questionnaire were adapted from Al-Alawi et al. (2007). Pilot studies were conducted to validate the measures prior to finalizing the questionnaire. Multiple regressions were used to test the relationship between independent and dependent variable as recommended by Sekaran (2007).

RESULTS

Respondents were asked to provide demographic information. In the demographic section, 79.8% of the respondents were male, while 20.2% were female. In the age category, 1.6% respondents were below 25 while a large number of respondents (55.8%) were between 25 to 35 age categories; second large number (22.5%) was in the 36 to 45 age group. Only 7% respondents belonged to the 46 to 50 age group and the rest of the

respondents (13.2%) were above 50. Education wise, 25.6% of the respondents were bachelor degree holders, 66.1% were masters' degree holders, and 3.1% were PhD's. Position wise, only 0.8% was top level managers, 15.5% mid level managers, 34.1% lower level managers, others were 49.6%.

In respect of number of years of experience, 20.2% had less than 2 years, 25.6% had between 2 to 4 years, 14.7% had between 5 to 7 years, 9.3% had between 8 to 10 years, and 30.2% had over 10 years' experience. 67.4% of the respondents' companies had less than 100 employees, 1.6 % each had 100-200, 300-400, and 401-500 respectively, and 4.7% had 201-300 whilst 23.3% had more than 500 employees. With respect to number of years of company operations, 77.5% companies have been operating for above 25 years, 17.1% for 11-15 years, only 1.6% each have been operating for 5-10 years and 16-20 years respectively, while the remaining 2.3% have been operating from 21 -25 years. As regards the firm's primary business, financial service constituted 62%, NGOs 19.4%, telecommunication 12.4% and others 6.2%. Considering the status of the companies, 'wholly local ownership' comprised 86.4%, "wholly foreign firms" only 0.8%, and "joint ventures" 12.4%.

Cronbach's alpha was chosen to analyze the degree of internal consistency among the items in a variable. Alpha coefficient ranges in value from 0 to 1. The higher the score, the more reliable the generated score is. According to George and Mallery (1999) there is no set interpretation in acceptable alpha values. A rule of thumb that applies in most studies is that acceptable alpha values are 0.50 to 0.90, but alpha values of less than 0.50 is not acceptable.

The internal reliabilities of all scales were between 0.520 and 0.851, exceeding the recommended value of 0.50, and therefore, accepted for further analysis. We have deleted one item from the trust items in order to improve the Cronbach's alpha score. Table 1 summarizes the results obtained from the reliability analysis.

Hypotheses testing

The four main hypotheses formulated were tested using regression analysis. The analysis was generated using the Statistical Package of Social Sciences (SPSS). Table

2 displays the results of the relationship between the variables identified earlier. All these hypotheses examine the impact of cultural elements on knowledge sharing. Trust, communication, leadership, and reward were considered as independent variables and knowledge sharing as a dependent variable. Based on the regression analysis output shown in Table 2, the R^2 value of 0.373 implies that 37.3 percent of the variation in knowledge sharing can be explained by these four independent variables. The condition indexes, VIF, and tolerance were found to be within acceptable range, thus ruling out the potential problem of multicollinearity.

Similarly, the Durbin Watson of 2.053 showed that there is no autocorrelation problem in this regression model. Table 2 also reveals that Trust (Sig. = 0.047), Communication (Sig. = 0.005), and Leadership (Sig. = 0.000) were significant at 5 percent significance or 95 percent confidence level. In contrast, Reward System (Sig. = 0.811) was found to have no significant impact on knowledge sharing at 5 percent significance level.

In a summary, from the regression output, we can conclude that the hypotheses related to the cultural dimensions, H_1 , H_2 and H_3 were accepted. Thus, we accept the following hypothesis:

H_1 : There is a positive relationship between trust among co-workers and knowledge sharing.

H_2 : There is a positive relationship between communications (interaction between staff and knowledge sharing).

H_3 : There is a positive relationship between leadership and knowledge sharing.

DISCUSSION

In this paper, we explored the relationship between trust among employees, Communications between staff, leadership, reward system and knowledge sharing. Our findings suggest that trust, communication, and leadership have a positive and significant relationship with knowledge sharing, and that reward system has a positive but insignificant influence on knowledge sharing.

Trust and knowledge sharing

This research finding showed that trust has a positive and significant relationship with knowledge sharing. The finding supports the findings of Al-Alawi et al. (2007), that trust is positively related to knowledge sharing in organizations. Some other authors also found positive relationship between trust and knowledge sharing (Andrews and Delahay, 2000; Levin, 1999; Mayer et al., 1995; Tsai and Ghoshal, 1998; Connelly and Kelloway,

2002; Issa and Haddad, 2008; De Long and Fahey, 2000). Some other authors also claim that the amount of knowledge that flows freely both between the employees and from employees into the firm's main databases is highly influenced by the level of trust that exists between the firm, its different functions and its employees (De Long and Fahey, 2000). Trust can play an improved role if the right organizational culture is put in place.

Especially, today, there is not only competition among the firms worldwide, but also there is competition among the employees within a firm. Therefore, if the organizational culture is such that employees suspect that sharing information with co-workers would be harmful for their careers, they will not openly discuss and share knowledge with other co-workers (Davenport and Prusak, 2000). Thus, the most important asset that facilitates the sharing of knowledge is a trustful relationship that is directly affected by a proper organizational culture (Issa and Haddad, 2008). The result of our study indicates that knowledge sharing can be improved by trust among employees. The reason behind the finding related to trust may be service organizations studied in this paper are mainly telecommunication companies, banks and NGOs where senior management significantly influences teams to share project-related information freely amongst virtual team members through seminars, workshops, and information and communication technology. Thus, a proper organizational culture where people can trust each other in sharing knowledge, would automatically lead to enhancement of knowledge sharing (Bakker et al., 2006).

Communications (interaction between staff) and knowledge sharing

The result related to communications demonstrated that communication (interaction between staff) has a positive and significant relationship with knowledge sharing. Al-Alawi et al. (2007) also found a positive relationship between communication and knowledge sharing. Previous studies also found that communication between co-workers is an important aspect in encouraging knowledge sharing (Smith and Rupp, 2002; Davenport and Prusak, 1997). In today's globalized world, due to technological advancement, information moves from one corner of the world to another within a few seconds. Therefore, if organizations, especially the service organizations where there is great deal of customer involvement with the organizations, cannot acquire and share timely knowledge about customers, competitors and markets between different departments, then it would be impossible for them to survive in the market. As a result, service organizations must create a floor for open discussion and debate which would motivate individuals at various levels to freely give their opinions and views on different issues (Davenport and Prusak, 1997). Formal organizational

Table 2. Regression summary

Variable	Beta	Sig.	Tolerance	VIF
Trust	0.164	0.047	0.758	1.319
Communication	0.231	0.005	0.782	1.279
Leadership	0.387	0.000	0.671	1.490
Reward	0.019	0.811	0.797	1.254
Knowledge sharing				

$R^2 = 0.373$; Durbin Watson = 2.053; F value = 18.457* $p < 0.05$.

structures that constrain reporting solely within divisional channels limit each division's access to knowledge obtained by other divisions of the corporation (Syed-Ikhsan and Rowland, 2004). "Such 'vertical structures raise barriers to knowledge transfers between different divisions because each division is operated largely as if an independent firm" (Lord and Ranft, 2000). In addition, the 'top-down' communication functions take too much time to filter down knowledge through every level of the organization (Syed-Ikhsan and Rowland, 2004). Contrary to this, if an organization supports communications network that operate freely, where knowledge providers and knowledge seekers can access information and knowledge through the shortest path, it will definitely enhance knowledge creation and knowledge sharing in the organization (Syed-Ikhsan and Rowland, 2004).

Leadership and knowledge sharing

Leadership was found to have a positive and significant relationship with knowledge sharing in this study. The role of leadership in improving knowledge sharing culture in organizations was also supported by other studies (Oliver and Kandadi, 2006; Kreiner, 2002; Kerr and Clegg, 2007; Kluge et al., 2001; Marsh and Satyadas, 2003; Welch and Welch, 2005; Nonaka, 1987). Kreiner (2002) found that leaders can influence employees to create the necessary knowledge locally. Kerr and Clegg (2007) also showed in their study that leadership is important to facilitate knowledge sharing within and across boundaries. They opined that leaders act as role models for the manner in which knowledge sharing occurs. They found that the leaders help to create network of knowledge members and provide best practice of coordination and collaboration activities. In our study, the positive outcome between leadership and knowledge sharing could be due to the actuality of continuous commitment shown by senior management over the last decade to ensure seamless information systems are in place, necessary and timely information is shared among teams, and communication channels are accessible and as short as possible across teams through the advancement of information technology (Islam et al.,

2009). We observed from the findings that the top management in service organizations significantly influences the employees to share needed and relevant information among team members with the help of various participative activities and information and communication technology. Actually, leadership at all managerial level is required to develop a desired culture in order to enhance knowledge sharing in organizations (Kluge et al., 2001, Marsh and Satyadas, 2003; Welch and Welch, 2005). Positive initiative should be taken by the top management to give proper work environment through ensuring that the necessary support and proper organizational structure are in place to facilitate knowledge sharing among different functional groups.

Reward system and knowledge sharing

Contrary to expectations, this study did not find reward system to be significantly associated with knowledge sharing, but previous researches which were based on developed and developing countries (Al-Alawi et al., 2007; Oliver and Kandadi, 2006; Syed-Ikhsan and Rowland, 2004; Davenport and Prusak, 2000; Gupta and Govindarajan, 2000; Cornelia and Kugel, 2004; Ling et al., 2009), argue that reward system is important for knowledge sharing. It may be because in Bangladeshi service organizations, despite the practice of reward system, the majority of the employees may not be motivated to share knowledge due to fear of losing their importance in the organization or fear of being replaced by another colleague. The reason could also be that in our culture, employees do not trust their colleagues, especially when it comes to sharing confidential information due to fear of being hurt by the vindictive action of their colleagues. Employees may fear that others may misuse knowledge or take unjust credit for it (Kerr and Clegg, 2007). Nevertheless, one cannot disregard that organizations need to carefully design a reward system that will inspire co-workers to share knowledge (Oliver and Kandadi, 2006) in order to achieve success. Al-Alawi et al. (2007) mentioned that in order for reward to be successful in motivating employees to share knowledge, these rewards must be properly designed to

fit employees' needs and perceptions. They said ineffective or insufficient rewards can fail to reinforce knowledge sharing behavior.

IMPLICATION OF THE RESEARCH

The findings of this study have practical implications for the scholars of other developed countries because this research underscores the importance of cultural elements in improving knowledge sharing in Bangladeshi service organizations. They may utilize the same model to examine if it also works in their service organizations. From the applications point of view, this research enables the managers of service organizations to identify the elements that need special attention in order to improve knowledge sharing. The knowledge of the dynamic relationship between cultural elements and knowledge sharing would help to reform the managerial approach that is used to enhance the extent of knowledge sharing. Thus, data generated from this study could be particularly useful to the managers of service organizations in formulating and reviewing knowledge sharing strategies in Bangladesh.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Despite these strengths, our study also has limitations. The findings of this study may be limited to the service industry in Bangladeshi. This study was conducted in Bangladesh service organizations only. Thus, the findings of this study might not be generalized to other cultures and countries. Future researchers can take steps to test the research framework on different industries and in different countries. One major limitation of this study is the small sample size. This was due to the very newness of this concept to the service organizations operating in Bangladesh. Follow-up work with large sample size is needed to judge if the results are applicable to corporations in other developing countries.

Conclusion

In this era of rapid technological advancement, the sharing of knowledge is very important for service organizations in order to meet customers' rapidly changing demands. If there is lack of sharing of knowledge amongst the employees and between different departments of service organizations, then it would be difficult for organizations to survive in today's competitive global environment. Service industries should take a more proactive approach to achieve a higher extent of knowledge sharing than other organizations because the

order to achieve more favorable outcome of knowledge service organizations constantly interact with customers who have different requirements and expectations. In sharing, organizations should provide greater emphasis on cultural elements. This study concludes that cultural elements, namely trust, communication between staff, and leadership are vital for knowledge sharing in Bangladeshi service organizations. It also cautions against the assumption that reward system enhances knowledge sharing because this paper revealed that reward system does not play a significant role in improving knowledge sharing in Bangladeshi service organizations.

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Full Length Research Paper

The impacts of brand equity, brand attachment, product involvement and repurchase intention on bicycle users

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The 15th Conference of the Parties (COP) under the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen was over on 19 December 2009. Undoubtedly, people will pay more attention to global warming and green life in the future. Enhancing protection of ecology is a key point in future development of world bicycle industry. Bicycle industry in Taiwan has complete upper, middle and lower systems. As bicycle companies in Taiwan gradually focus on medium and high end bicycles and total export reached USD1.2 billion in 2009. This shows increasing added values. In such a competitive environment, bicycle brands must offer various product types to meet needs of different consumers. Brands are important intangible assets to a company and under great attention of major world players. Therefore and this study aims at impacts of brand equity, brand attachment, product involvement and repurchase intention on bicycle users when selecting bicycle brands and engaging in activities. Target included users in bicycle recreation on bicycle lanes in areas north of Taichung. A total of 400 questionnaires were issued in convenience sampling; 350 valid questionnaires were collected and verified with LISREL. The conditions were: brand equity has positive influence on brand attachment, repurchase intention and product involvement; product involvement has positive influence on brand attachment and repurchase intention and indirect influence on brand attachment through product involvement. Through product involvement and brand attachment, it has indirect influence on repurchase intention. Suggestions were proposed against the preceding conclusions as reference on marketing strategies and operation management in developing own brands by bicycle companies in Taiwan.

Key words: Bicycle, brand equity, brand involvement, brand attachment, repurchase intention, Structural Equation Modeling.

INTRODUCTION

People will pay more attention to global warming and green life in the future. Enhancing protection of ecology is a key point in future development of world bicycle Industry. Bicycle industry in Taiwan boasts complete upper, middle and lower stream systems. As proprietors involved themselves in medium/high end bicycles, our average

export unit price of bicycles started climbing from 2003. The average export unit price reached USD200 in 2005. According to Chinese National Export Enterprises Association (CNEEA), output in 2007 in Taiwan is 5.12 million bicycles at NTD3.9 billion. In addition to increased orders of full bicycle companies and the climate of energy saving and carbon reduction in environmentally friendly leisure overseas also boosted market growth. Total export amount reached USD1.2 billion in 2009, showing growing added values of bicycle industry in Taiwan.

Under such competitive industry environment, bicycle brands must offer a variety of product types to meet

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demands of different customers. Brands are a significant intangible asset to enterprises and valued by major world players. Aaker (1991) believes that future marketing war will be a war of brands. Unde (1994) holds that brand orientation is a key strategy for businesses to survive and grow, as differences among products will be increasingly smaller. Only with outstanding products does not guarantee victory in market. Businesses need brands with strong brand equity. Major businesses focus on establishment and management of brands, which are also considered one of the sources of competitive edges; brands will win identification and trust from customers while product differences are not significant or fail to sustain for a long time. Brands also serve as foundation of integrative marketing combination and marketing strategies in unstable environment (Laforet and Saunders, 1994), the primary goal of major businesses is to have products with high brand equity in tough competitions.

For Aaker (1991), brand equity covers five essential factors, or sources of value creation. They include: brand loyalty, brand awareness, perceived quality, brand association, and other exclusive brand assets such as patents, logos and channel relation. With higher consumers' ability to explain or handle information and trust in purchase policy, and satisfaction and the five factors enhance brand values to customers. Higher marketing efficiency and efficacy, brand loyalty, price and profits, brand extension, channel relation and competitive edges create company values; values to customers will bring more values to companies. To sum up, brand equity is based on behaviors of consumers and ideas of competitions to provide target consumers with various values to bring interests that help companies. Keller (1993) holds that brand equity is from marketing results of brands, subject to brand knowledge of consumers. Brand knowledge is core of brand equity. Brand knowledge is an associative network memory model made up of brand awareness and brand image.

One of the key issues in marketing science is to understand and predict consumers' response to brands. Park, Macinns and Prester (2006) believe that brand attachment is an idea based on relation process and a link to connect brands and self-recognition and emotions of consumers. It better explains specific consumer behaviors of higher levels. Strong brand attachment is the foundation of businesses' brand established top and brand asset formation. Relation between brand attachment levels and different behaviors will form a level. Idea of brand attachment is not old; it has won attention as new angle in brand emotion factor study in marketing. Bagozzi (2006) also holds that attachment is a significant issue full of hope and worth study.

Product involvement of consumers determines whether they accept product messages actively or passively, affecting level of collecting information and then process of purchase decisions (Zaichkowsky, 1994). Richins and Bloch (1986) point out that product involvement is the level that consumers link themselves with continuous or

specific situation goals. In a broad sense, product involvement covers continuous involvement and situation involvement in nature. According to Huang and Lai (1990), different levels of product involvement results in different nature of consumers' decisions. Involvement level can be defined as relation with individuals; different consumers have different product involvement on the same products. Consumers, product types and situations affect consumers' products involvement (Bloch and Richins, 1983).

Enhancing consumers' purchase intention is the most important issue in any industry. Aaker (1973) believes that customers tend not to switch to other brands on products in high purchase frequency, as they are used to the brand. Zeithaml, Berry, and Parasuraman (1996) hold that, when customers no longer buy products or services of a company and the company will suffer from financial loss such as cost to win new customers. In mobile communication service industry, companies introduce promotional activities to entice customers with mobile phone numbers to be due to resume the contracts. Lee and Feick (2001) point out the seriousness of customer loss in mobile communication service market. Proprietors lose over 30% of customers each year. Winning new customers requires high cost. Purchase decision of consumers is a complicated cycle process. For consumers, feelings after purchase will be in feedback to collection of purchase experience and affect future repurchase intention.

Thus, brands are a very important asset to companies, who wish to enhance their brand equity. Brand attachment is a link connecting brand and consumers' self-recognition and emotions. It better explains specific consumer behaviors in higher levels. Level of consumers' product involvement affects awareness of risks to affect decisions of consumers. It is hoped to understand whether consumers intend to have repeated purchase of a certain brand to have repurchase intention. The findings, hopefully, will make sure of development of bicycle proprietors in own brands and bicycle proprietors will have better brand management to enhance their competitive edges in market.

METHODOLOGY

Based on study questions and purpose as well as literature review results and the study aims at relation between bicycle brands and consumers. The four major dimensions discussed are: brand equity, brand attachment, level of involvement and repurchase intention. The study structure and themes are given in Figure 1.

The study's hypotheses include:

H₁: for bicycle consumers, brand equity directly affects brand attachment and through product involvement, indirectly affects brand attachment. This hypothesis has three sub-hypothesis:

H_{1a}: for bicycle consumers, brand equity has positive influence on product involvement.

H_{1b}: for bicycle consumers, brand equity has positive influence on

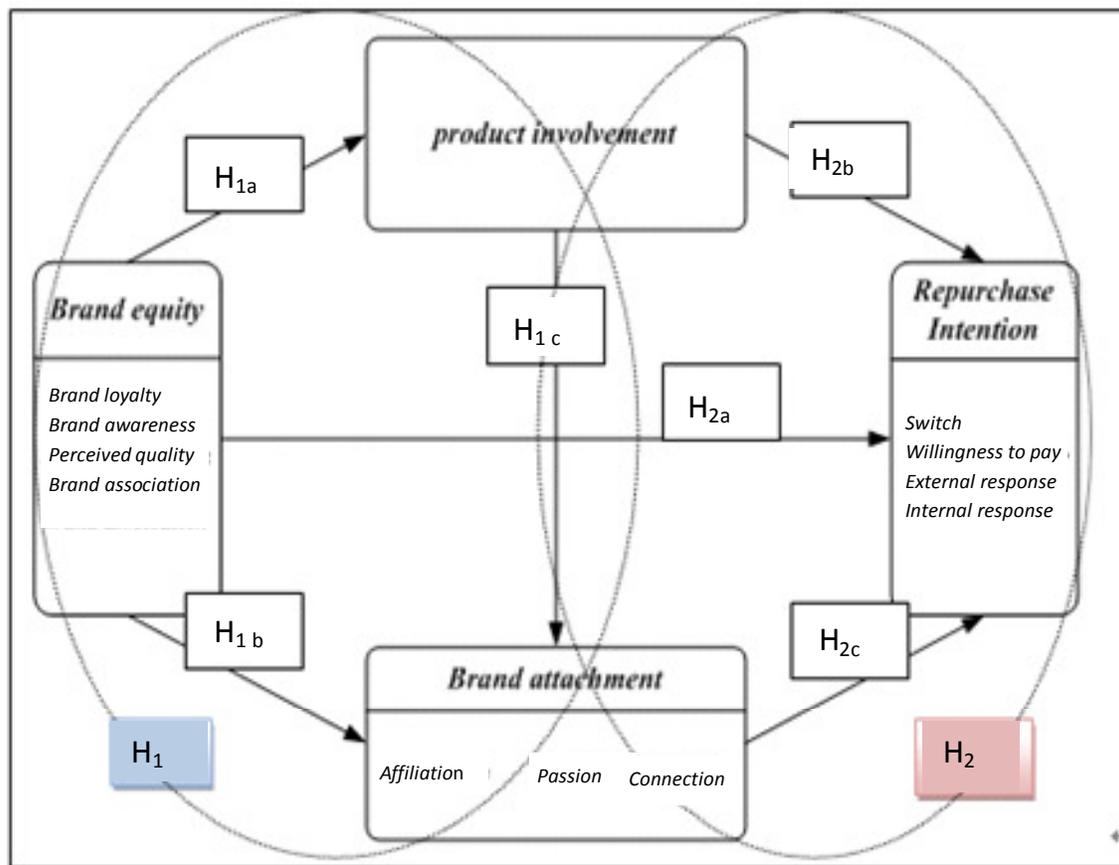


Figure 1. Study structure ideas.

brand attachment.

H_{1c}: for bicycle consumers, product involvement has positive influence on brand attachment.

H₂: for bicycle consumers, brand equity has direct influence on repurchase intention and through product involvement and brand attachment, indirect influence on repurchase intention. This hypothesis includes HA3 and following sub-hypothesis:

H_{2a}: for bicycle consumers, brand equity has direct influence on repurchase intention.

H_{2b}: for bicycle consumers, product involvement has positive influence on repurchase intention.

H_{2c}: for bicycle consumers, brand attachment has direct influence on repurchase intention.

Based on literature review and collected information in accordance with proceeding study structure and study hypothesis and the questionnaire has five parts. Part I: descriptive statistics and analysis of social background of bicycle brand consumers. Part II: in reference with scale by Aaker (1996) on measurement of brand equity and there are 14 questions in dimensions of brand loyalty, brand association, perceived quality, and brand awareness. Part III: with study by Thomosn, Maclnins and Park (2005), brand attachment is defined as a relation of emotions and unique links between consumers and brands. There are 10 questions in 3 dimensions of emotions, passion and association. Part IV: there are four questions in reference of study by Zaichkowsky (1994) on questions to measure product involvement levels. Part V: there are 11 questions

in four dimensions of transfer, payment intension, external reactions and internal reactions, in reference of repurchase intention scale by Parasuraman, Zeithamal and Berry (1996).

Population is consumers owing bicycle brands individually or with the family in Taiwan in February and March 2010; if they have more than 2 bicycles, answers shall be given based on the most frequently used bicycle brands; samples are taken in convenience sampling in non-ratio sampling. Relation among brand equity, brand attachment, involvement levels and repurchase intention is discussed with Structural Equation Modeling (SEM). A total of 400 questionnaires were issued; 377 were collected. There are 350 valid questionnaires at usability rate of 92.8% after deletion of questionnaires without complete answers.

RESULTS

A total of 400 questionnaires were issued in convenience sampling; 350 valid questionnaires were collected. Table 1 shows demographic profile of interviewees.

Before verification analysis, item analysis is made to understand feasibility and appropriateness of tests to enhance quality of test questions and have higher validity and reliability. Reliability of items is identified with correlation relevant analysis methods and internal consistency.

Table 1. Distribution of social demographic variables of interviewees.

Demographic statistics variable		Person times	Percent
Gender	Male	211	60
	Female	139	40
Age	Below 18	6	1.7
	18 to 25	90	26
	26 to 30	134	38
	31 to 40	80	23
	41 to 50	26	7
	Over 51	14	4
Residence place	Taipei City/County	125	35.7
	Taoyuan County	73	20.9
	Hsinchu City/County	69	19.7
	Taichung City/County	83	23.7
Education attainment	Below junior high school	1	0.3
	Senior (vocational) high school	68	19.4
	Junior college	63	18
	University	185	52.9
	Graduate school	33	9.4
Occupations	Military, personnel public servants and teachers	15	4.3
	Industry	36	10.3
Occupations	Commerce	53	15.1
	Medical care	10	2.9
	Information	63	18
	Service	118	33.7
	Manufacture	8	2.3
	Students	47	13.4
Average personal monthly income (NT)	<9999	46	13.1
	10000~19999	32	9.1
	20000~29999	116	33.1
	30000~39999	94	26.9
	>40000	62	17.7
bicycle brands	Giant	174	49.7
	Merida	47	13.4
	KHS	44	12.6
	DAHON	23	6.6
	FUJI	16	4.6
	Doppelganger	13	3.7
	Flamingo	2	0.6
Other brands	31	9	

Correlation analysis involves product-moment correlation of scores and total scores of each item. If the relation is significant ($p < 0.05$) and product-moment correlation

exceeds 0.3 and the items has sound identification (Hair, Anderson, Tatham and Black, (1998). Internal consistency analysis ranks scores of each interviewee; those

Table 2. Item analysis of each dimension.

Variable	Brand equity	Brand attachment	Product involvement	Repurchase intention
Correlation coefficient <i>r</i>	0.32 - 0.75	0.30 - 0.77	0.4 - 0.67	0.31 - 0.56
independent samples <i>t</i> -test	6.49 - 25.72	10.03 - 21.78	14.28 - 20.95	7.64 - 14.42

Table 3. Skewness and kurtosis of observed variables.

Variable	Average	Standard deviation	Kurtosis	Skewness
Brand equity	2.59 - 4	0.579 - 1.04	-0.99 - 1.23	-0.98 - 0.38
Brand attachment	3.13 - 3.79	0.68 - 0.95	-0.64 - 0.76	-0.90 - -0.22
Product involvement	3.15 - 3.87	0.65 - 0.90	-0.39 - 0.28	-0.80 - 0.01
Repurchase intention	3.15 - 3.77	0.53 - 0.91	-0.44 - 0.50	-1.18 - -0.10

with to 25% scores are in high score group; those with bottom 25% scores are low score group. Average of each item in high and low score groups are calculated to check if each question is distinctive in high and low score groups. Tests are then made with independent samples *t*-Test. If the question is distinctive ($p < 0.05$) and *t* exceeds 3, it has identification and has to be kept or deleted if vice versa (Hair et al., 1998). In Table 2, all items are distinctive and questions have sound identification.

Causal relation among variables in model idea is discussed with SEM. Before LISREL analysis, we shall first confirm if samples meet basic presumption of SEM—whether data are in normal distribution to avoid affecting model estimation and test results. To confirm if samples are in normal distribution, one shall first check sample kurtosis and skewness. If kurtosis absolute value exceeds 10 and there are problems with the samples; if skewness absolute value is over 3, it is deemed extreme value. The two are in violation of basic presumption of SEM (Kline, 1998). In Table 3, study results show all observed variables' skewness and kurtosis do not greatly affect estimation with normal distribution. Maximum Likelihood (ML) is used in estimation model in the study.

Confirmatory factor analysis

Key variables in this study include brand equity, brand attachment, involvement levels and repurchase intention. Confirmatory Factor Analysis (CFA) is made on the measurement models of the four variables.

LISREL program offers a number of fit test measures to test internal fit of presumed models with test values of measures. With suggestions of Huang (2007), Wu (2007), Hu and Bentler (1999), Hair et al. (1998), Bentler and Bonett (1980), Absolute Fit Measures, Incremental Fit Measures and Parsimonious Fit Measures are adopted check internal fit of items with CFA on brand equity, brand attachment, product involvement and repurchase

intention. In absolute fit measures, GFI (goodness of fit index) standard value shall exceed 0.9; standardized root mean square residual (SRMR) shall be below 1; root mean square error of approximation (RMSEA) shall be less than 0.05. This means theory model is acceptable. This standard is good fit; if RMSEA is between 0.05 and 0.08, it is fair fit. In general, less than 0.08 is acceptable fit; adjusted goodness of fit index (AGFI) shall exceed 0.9. In Incremental Fit Measures, non-normed fit index (NNFI) shall be between 0 and 1. If structural equation is fit and the value will be close to 1. Value over 0.9 is recommended; Comparative fit index (CFI) is between 0 and 1. Larger value means better fit. Value over 0.9 is recommended; in parsimonious fit measures, parsimonious normed fit index (PNFI) shall have high values. In general, PNFI over 0.5 is standard; Parsimonious Goodness of Fit (PGFI) is between 0 and 1. Value closer to 1 means the model is more parsimonious. PGFI over 0.5 is acceptable standard; In Chi-square freedom index (χ^2/df) and the value shall be as small as possible and less than 3 is standard. Factor load of item (observed variables) by Jöreskog and Sörbom (1989) shall be distinctive and standard coefficient shall be no less than 0.45.

In measurement model of brand equity, brand attachment, product involvement and repurchase intention, some measure fail to pass threshold. With Modification Index (MI), it is found some questions have high mutual relation.

If observed item MI is over 3.84, modification is deemed possible. Only one parameter is released each time in principle. Try to start from observed items with maximum MI (Huang, 2007). Questions are deleted, including Q13 and Q16 in brand equity, Q24, Q25 and Q28 in brand attachment and Q35 in repurchase intention.

After model MI and test models of brand equity, brand attachment, product involvement and repurchase intention pass overall model fit test and factor load test as

Table 4. Internal fit test results after modified brand equity, brand attachment, product involvement and repurchase intention.

Fit index	Standard value	Brand equity	Brand attachment	Product involvement	Repurchase intention
GFI	>0.90	0.93	0.99	0.99	0.96
SRMR	>0.10	0.04	0.02	0.02	0.05
RMSEA	≤0.08	0.07	0.06	0.05	0.06
AGFI	>0.90	0.90	0.95	0.97	0.93
NNFI	>0.90	0.96	0.98	0.98	0.96
CFI	>0.90	0.97	0.99	0.99	0.97
PNFI	>0.50	0.72	0.50	0.63	0.66
PGFI	>0.50	0.60	0.58	0.50	0.54
χ^2/df	$\chi^2/df < 3$	2.98	2.63	1.94	2.41

Table 5. Scale reliability and validity.

Potential variable	Individual reliability (R^2)	CR	AVE
Brand equity	0.30 - 0.76	0.85	0.54
		0.62	0.45
		0.63	0.46
		0.74	0.50
Brand attachment	0.42 - 0.74	0.62	0.45
		0.79	0.65
		0.76	0.62
Product involvement	0.35 - 0.77	0.76	0.45
		0.64	0.49
Repurchase intention	0.27 - 0.90	0.81	0.59
		0.76	0.76
		0.68	0.68

in Table 4.

Scale reliability and validity

After the model is checked with offending estimate, assessment of internal fit measure and factor load, assessment is made on scale reliability and validity.

The main purpose is to test single observed item reliability and potential variable reliability. Huang (2007) points out 0.20 can be low standard for single variable reliability. SEM also has reliability measures to test potential variables, called Composite reliability (CR). Hari et al.

(1998) believe that CR is to calculate standard load of individual variables through CFA to have factor reliability and potential variables' CR.

Bagozzi and Yi (1988) suggest CR exceed 0.60; Raines-Eudy recommends CR over 0.50. In validity, index variable variance can be explained with Average Variance Extracted (AVE).

Higher extraction of average variance means the idea has higher convergent validity. Bagozze and Yi (1988) suggest over 0.5 as standard value; Gomez, Arranz and Cillan (2006) believe it shall exceed 0.45 to meet standard. The formula is as follows:

$$\text{Composite reliability (CR)} = \frac{(\sum \text{standardized_loading})^2}{[(\sum \text{standardized_loading})^2 + \sum \text{indicator_measurement_error}]}$$

Table 6. Internal model fit test of the study.

Fit measure	Test	Standard	Result
GFI	0.95	>0.9	O.K.
SRMR	0.03	<0.1	O.K.
RMSEA	0.04	≤0.08	Good fit
AGFI	0.93	>0.9	Close
NNFI	0.99	>0.9	O.K.
CFI	0.99	>0.9	O.K.
PNFI	0.79	>0.5	O.K.
PGFI	0.67	>0.5	O.K.
χ^2/df	1.58	$\chi^2/df > 3$	O.K.

$$\text{Average variance extracted (AVE)} = \frac{(\sum \text{standardized_loading}^2)}{[\sum \text{standardized_loading}^2 + \sum \text{indicator_measurement_error}]}$$

In which, standardized loading = observed items' standardization parameters in potential variables; Indicator measurement error = observed item measurement error.

Brand equity CFA model scale reliability and validity is in Table 5. Individual reliability and CR meet threshold by earlier scholars. Convergent validity exceeds 0.45. Thus and the study has sound CR and convergent validity.

Path analysis

Before study hypothesis test, observed item fit in the model is understood with path analysis; the path analysis includes offending estimate and internal model fittest. From offending estimate check by earlier scholars, it is found measurement error parameters of δ_1 to δ_4 and ϵ_1 to ϵ_{11} is 0.11 to 0.68.

There is no minus value; standardization coefficients of observed items λ_{a1} to λ_{d4} are 0.57 to 0.94. None exceeds or is too close to 1; standard error λ_{a1} to λ_{d4} of observed items is between 0.03 and 0.05 without great standard errors.

Path analysis in this study passes check of offending estimate to reach suggested standard of earlier scholars, showing that brand equity, brand attachment, product involvement and repurchase intention have sound overall fit as in Table 6.

In the study, γ and β represent each hypothesis path in the hypothesis structure model. Parameters of γ and β may confirm whether hypothesis path in hypothesis model in the study is established.

H_{1a}: The findings show, for bicycle consumers, product involvement is affected by brand equity. Standardization coefficient (γ_1) is 0.48 and t is 8.34. Both are statistically distinctive ($p < 0.05$) and have positive influence. Explanation of brand equity on product involvement is 23%

($0.48 \times 0.48 = 0.23$) for bicycle consumers, brand equity does have positive influence on product involvement. Hypothesis is established.

H_{1b}: the findings show, for bicycle consumers, brand attachment is affected by brand equity. Standardization coefficient (γ_2) is 0.33 and t is 5.43. Both are statistically distinctive ($p < 0.05$), explanation of brand equity on brand attachment is 11% ($0.33 \times 0.33 = 0.11$) in positive influence. For bicycle consumers, brand equity does have positive influence on brand attachment. Hypothesis is established.

H_{1c}: the findings show, for bicycle consumers, brand attachment is affected by product involvement. Standardization coefficient (β_1) is 0.29 and t is 4.79, statistically distinctive ($p < 0.05$) and have positive influence. Product involvement explanation on brand attachment is 8% ($0.29 \times 0.29 = 0.08$). For bicycle consumers, product involvement has positive influence brand attachment. Hypothesis is established.

H₁: From **H_{1a}**, **H_{1b}** and **H_{1c}**, for bicycle consumers, brand equity has direct influence on brand attachment and indirect influence on brand attachment through product involvement. **H₁** hypothesis is established. From residual and total direct and indirect explanation of brand attachment by brand equity and product involvement is 28% ($R^2 = 1 - 0.72 = 0.28$).

H_{2a}: The findings show, for bicycle consumers, repurchase intention is affected by brand equity. Standardization coefficient (γ_3) is 0.22 and t is 3.88, statistically distinctive ($p < 0.05$) and having positive influence. Brand equity explanation on repurchase intention is 5% ($0.22 \times 0.22 = 0.05$). For bicycle consumers, brand equity has positive influence on influence on repurchase intention.

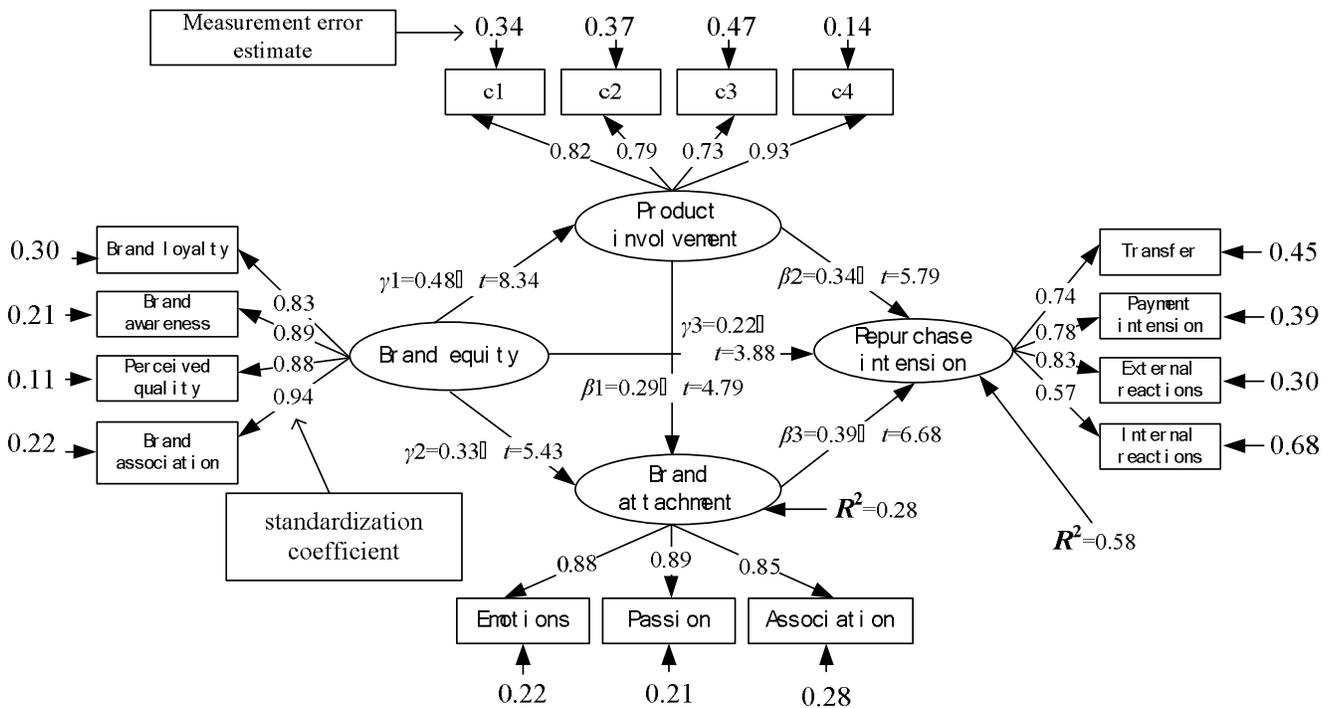


Figure 2. Path analysis standardization estimation of brand equity, brand attachment, product involvement and repurchase intention.

Hypotheses are thus established.

H_{2b}: the findings show, for bicycle consumers, repurchase intention is affected by product involvement. Standardization coefficient (β_2) is 0.34 and t is 5.79, statistically distinctive ($p < 0.05$) and having positive influence. Product involvement explanation on repurchase intention is 12% ($0.34 \times 0.34 = 0.12$). For bicycle consumers, product involvement has positive influence on repurchase intention. Hypothesis is established.

H_{2c}: the findings show, for bicycle consumers, repurchase intention is affected by brand attachment. Standardization coefficient (β_3) is 0.39 and t is 6.68, statistically distinctive ($p < 0.05$) and having positive influence. Brand attachment explanation on repurchase intention is 15% ($0.39 \times 0.39 = 0.15$). For bicycle consumers, brand attachment has positive influence on repurchase intention. Hypothesis is established.

H₂: from H_{2a}, H_{2b}, H_{1c} and H_{2c}, for bicycle consumers, brand equity, through brand attachment and product involvement, has indirect influence on repurchase intention. From residual, total direct and indirect explanation of repurchase intention by brand equity, brand attachment and product involvement is 58% ($R^2 = 1 - 0.42 = 0.58$). H₂ is established. From activity relation chart, H_{1a} (0.48) and H_{2c} (0.39) have great direct influence effects as in Figure 2.

Conclusions

1. For bicycle consumers, brand equity has positive influence on product involvement. The findings show, for bicycle consumers, product involvement is affected by brand equity. Standardization coefficient is 0.48 and t is 8.34, statistically distinctive ($p < 0.05$). For bicycle consumers, brand equity has positive influence on product involvement. Brand equity affects consumers' product involvement. Brand equity makes consumers pay more attention to products so they look for messages on products actively. High and low involvement levels and relation with brand equity are established; brand value is enhanced.
2. For bicycle consumers, brand equity has positive influence on brand attachment. The empirical findings show, for bicycle consumers, brand attachment is affected by brand equity. Standardization coefficient 0.33 and t is 5.43; both are statistically distinctive ($p < 0.05$) and have positive influence. Brand equity has positive influence on brand attachment. Higher brand equity will lead to higher attachment of consumers, who are willing to buy, invest in brands and maintain their relation with brands.
3. For bicycle consumers, product involvement has positive influence on brand attachment. The findings show, for bicycle consumers, brand attachment is positively affected by product involvement. Standardization coefficient is 0.29 and t is 4.79, statistically distinctive ($p < 0.05$). When consumers have different involvement, they indirectly have brand attachment and consequence results. If

brand and consumers have distinctive association, attachment leads to different strong behaviors and extend to businesses through products and brands. Businesses will enjoy growing revenues and enhance brand asset to have competitive edges.

4. For bicycle consumers, brand equity has direct and positive influence on repurchase intention. The findings show, for bicycle consumers, brand equity has direct and positive influence on repurchase intention. Standardization coefficient is 0.22 and t is 3.88, statistically distinctive ($p < 0.05$). Brand equity of consumer has direct association with purchase intention. Higher brand equity may lead to higher purchase intention.

5. For bicycle consumers, product involvement has positive influence on repurchase intention. Consumers are involved in products when evaluating product property. Once products are important to consumers, consumers have higher involvement. The findings show, for bicycle consumers, product involvement has positive influence on repurchase intention. Standardization coefficient is 0.34 and t is 5.79, statistically distinctive ($p < 0.05$). If consumers have higher interaction with products, they have higher overall evaluation and higher repurchase intention. Thus, higher consumer product involvement leads to higher relation between consumers and repurchase intention. That is, repurchase intention influence will be more distinctive.

6. For bicycle consumers, brand attachment has positive influence on repurchase intention. The empirical findings show, for bicycle consumers, brand attachment has positive influence on repurchase intention. Standardization coefficient is 0.39 and t is 6.68, statistically distinctive ($p < 0.05$). Once brands provide consumers with required resources, consumers believe the brands have personalized meaning and are related to them. The brands offer sensory organ pleasures, enjoyment or beauty to meet consumer egos and transform to repurchase intention.

7. For bicycle consumers, brand equity has direct influence on brand attachment and, through product involvement, indirect influence on brand attachment. Total direct and indirect residual brand attachment explanation by brand equity and product involvement is 28% ($R^2 = 1 - 0.72 = 0.28$). To enhance consumer attachment on brands, businesses have to strengthen brand equity and product involvement so that consumer will have emotions, relation and commitment of person to person on the brands. Brand attachment will precisely predict consumer loyalty on brands, show nature of interaction between consumers and brands and precisely predict consumers' commitment and specific purchases. Consumers will pay high price to be attached to brands and businesses will reach the goal of brand attachment.

8. For bicycle consumers, brand equity has direct influence on repurchase intention and, through product involvement and brand attachment, indirect influence on

repurchase intention. Total direct and indirect residual

repurchase intention explanation by brand equity, brand attachment and product involvement is 58% ($R^2 = 1 - 0.42 = 0.58$). To enhance market productivity and increase consumer repurchase intention, businesses must enhance brand equity, product involvement and brand attachment to have higher consumer repurchase intention.

IMPLICATIONS

1. Building brand equity, brand attachment, and product involvement, taking actions in consideration of company interests based on customers' experience and understanding of brands in order to provide target consumers with values and then bring interests to companies.

2. Businesses shall have comprehensive brand management system in integration, including brand images, post-sale service, product design, and contact between business brands and consumers, which will meet brand values and present brand intention. Other than external communication, brand managers will help internal communication to convey business brand culture and have internal and external integration to enhance brand levels and ensure brand consistency.

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Full Length Research Paper

Relationship between leadership behaviors and task performance: The mediation role of job satisfaction and the moderation role of social distance

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The aims of this study were to investigate the relationship between transformational, transactional leadership and task performance and to clarify the mediating effects of job satisfaction. Besides, we examined the effects of the moderating effects of social distance on transformational, transactional leadership and job satisfaction. Two hundred and sixty six employees from 43 electronic companies in Taiwan participated in this study. The results showed that transformational and transactional leadership had a significant positive relationship with task performance. Job satisfaction was a mediator of the relationship between transformational, transactional leadership and task performance. Finally, we found that social distance had negative moderating effects: When the degree of social distance was high, the positive relationship between transactional leadership and job satisfaction was weaker; on the other hand, when the degree of social distance was low, the negative relationship between transactional leadership style and task performance was stronger. But social distance did not have significant moderating effects on transformational leadership.

Key words: Transformational leadership, transactional leadership, job satisfaction, task performance social distance.

INTRODUCTION

Almost every organization faces speedy changes in reduced product life cycles, globalization, and technology that initiate modern day competition (Mumford and Gustafson, 1988). Organizations have to deal with much confusion as change is a constant dynamic (Berquist, 1993). Kotter (1990) stated that changes in the workplace require more leadership for organizational employees and stakeholders (Kotter, 1990). Employees' work behaviors are crucial to organizational success in rapidly changing economic environments (Frese and Fay, 2001; Crant, 2000). A number of studies have examined various intervening processes through which leadership effects are ultimately realized in terms of performance outcomes (Liao and Chuang, 2007; Schaubroeck, Lam and Cha, 2007; Piccolo and Colquitt, 2006; Wang, Law, Hackett, Wang and Chen, 2005; Avolio, Zhu, Koh, and Bhatia,

2004; Bass, Avolio, Jung, and Berson, 2003; Bono and Judge, 2003; Kark, Shamir, and Chen, 2003). Furthermore, two meta-analyses have been invested into understanding that leadership relates to work attitudes, behavior, and performance at both the individual and the organizational level (Dumdum, Lowe, and Avolio, 2002; Lowe, Kroeck, and Sivasubramaniam, 1996). However, the mechanisms and processes by which leaders exert their influence on their followers' motivation and performance have not been adequately addressed in previous literature (Bono and Judge, 2003; Kark and Shamir, 2002; Lord, Brown, and Feiberg, 1999; Yukl, 1998).

Clearly, there is a need for greater attention for the understanding of the mechanisms and processes through which transformational and transactional leadership influences work-related attitudes such as job satisfaction and task performance in order to develop a more complete understanding of the inner workings while discussing transformational leadership (Bass, 1999). One contextual variable, which potential importance, which the

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literature has under explored, is leader-follower distance (Collinson, 2005). Antonakis and Atwater (2002) contended that, although overlooked within leadership research, distance was a key contextual factor and, thus, a defining element of the leadership influences the process. Further, they defined leader-follower distance in terms of three independent dimensions: physical distance, social distance, and the amount of interaction between leader and follower. Shamir (1995) conducted an exploratory study and discovered that followers perceived some traits and behaviors of close and distant charismatic leaders differently. In a similar vein, Yagil (1998) found that followers attributed different charismatic qualities to close and distant leaders. However, very few studies examine the influences of leader-follower distance caused by power, authority, status, and social standing.

The goals of this study are twofold. First of all, we set out to examine the mediating role of followers' job satisfaction on the relationships between leadership behaviors and task performance. Second, we explored the moderating role of social distance (that is, how power, authority, and rank made distance between leaders and followers) on the positive relationship between leadership behaviors and job satisfaction in the Taiwanese electronics companies. We hypothesized that with high social distance between leader and follower, the relation between leadership and job satisfaction was weaker compared with low social distance.

LITERATURE REVIEW

Leadership behaviors: Transformational and transactional leadership

An extensive body of research in organizational behavior has focused on identifying the leadership styles of supervisors that could enhance work performance (Bass, 1990; House and Aditya, 1997). This study applies the "Full-range Leadership Theory" as conceptualized by Bass (1985) and developed by Avolio and Bass (1991). They distinguish three major types of leadership behaviors: transformational, transactional leadership and laissez-faire, our study was focus heavily on the transformational and transactional leadership.

Transformational leaders have charisma, inspiration, intellectual stimulation and individualized consideration of employees (Bass and Avolio, 2000; Bass, 1999).

Bass's (1985) conception of transactional leadership emphasizes two factors: contingent reward and management-by-exception. Contingent reward refers to the efforts made by the leader to clarify expectations so that followers will understand what they need to do in order to receive rewards. Management-by-exception is a less active approach to leadership that essentially informs followers of job expectations, but resists further involvement with the follower unless the follower's actual

performance significantly varies from those expectations.

Bass and Avolio (1994) compared transformational leadership with transactional contingent reward leadership and passive leadership. Transactional contingent reward occurs when leaders assign a secure agreement on what needs to be done and what rewards followers can expect if they fulfill the agreement. Transformational leadership style usually generates higher performance than transactional leadership (Bass and Avolio, 2000).

The relationship between leadership behaviors and task performance

Leadership affects a wide array of work behaviors, including followers' motivation, self-efficacy, creativity, coping with stress (Bass, 2006). It also predicts crucial work-related outcomes such as task performance (DeGroot, Kiker and Cross, 2000).

Transformational leaders enhance the self-concept of followers and encourage followers' personal and collective identification with the goals and objectives of both the leaders' and the organizations (Shamir et al., 1993). Skilled transformational leaders have the ability to support and educate employees, while challenging them to stretch themselves in order to do their jobs and encourage the employees in their efforts to promote job aims and goals (Eran, 2007). Inspirational motivation is defined as the degree to which leaders articulate an appealing vision and behave in ways that motivate those around them by providing meaning and challenge to their followers' work. Intellectual stimulation is defined as the degree to which leaders stimulate their followers' effort to be innovative and creative by questioning assumptions, reframing problems, and approaching old situations in new ways (Bass et al., 2003). Therefore, transformational leaders use inspirational motivation and intellectual stimulation to encourage followers in their efforts to promote task performance.

Transactional leadership occurs when a leader exchanges something of economic, political, or psychological value with a follower. These exchanges are based on the leader identifying performance requirements and clarifying the conditions under which rewards are available for meeting these requirements and transactional behaviors can accomplish the leader's goals and also satisfy the interests of the followers (Whittington et al., 2009). Transactional leadership behavior engages followers in an agreement that specifies the followers' performance expectations and the consequences for meeting those expectations. When followers are confident about their specific role expectations, they may be more likely to go beyond the formal performance (Organ, 1988).

Although transformational and transactional leadership are two different leadership behaviors, they both serve the same function to engage followers into their work and

generate task performance.

The mediating role of job satisfaction between leadership behaviors and task performance

Many theoretical and empirical studies have demonstrated the leadership is an important factor that might be affecting both followers' job satisfaction (Nielsen et al., 2009; Fuller et al., 1999; Ugboro and Obeng, 2000) and performance (Parry, 2003; MacKenzie et al., 2001; Pillai et al., 1999; Geyer and Steyrer, 1998; Lowe et al., 1996). Job satisfaction is defined as a pleasurable or positive emotional state resulting from the appraisal of one's job and job experience (Locke, 1976). Transformational leaders exhibit idealized influence, arouse inspirational motivation, provide intellectual stimulation, and treat followers with individualized consideration (Avolio et al., 1999). Transformational leadership affects organizational outcomes by determining leadership behaviors and functions, such as charisma, vision, intellectual stimulus, individualized consideration, and inspirational motivation (Bass, 1985; Podsakoff et al., 1997). Bass (2006) pointed that leaders who are inspirational and show commitment to organization, who challenge their followers to think and provide resource (input), and who show genuine concern for followers have satisfied followers such as job satisfaction.

Locke and Latham (1990) showed when employees have challenging and specific goals, suitable task strategies, and clear linkages between performance and the rewards they desire, high levels of performance will result. Because effective transactional leaders clarify the performance expectations they hold for their followers, and these followers can be expected to perform well. Previous studies have also shown transactional could be positively related to followers' commitment, satisfaction, and performance (Bycio, Hackett, and Allen, 1995; Podsakoff, Todor, Grover and Huber, 1984; Hunt and Schuler, 1976).

According to social exchange theory, when employees feel satisfied with their jobs, they reciprocate with positive behavior to benefit the organization (Organ and Ryan, 1995). Bateman and Organ (1983) suggested that employees with a high degree of satisfaction can dedicate their efforts and display behavior beneficial to organizations. Dissatisfied workers are likely to be absent from work and perform at a lower level.

Based on the above arguments, we hypothesize that:

H_{1a}: Followers' job satisfaction mediates positively the relationship between transformational leadership and task performance.

H_{1b}: Followers' job satisfaction mediates positively the relationship between transactional leadership and task performance.

Social distance as a moderator between leadership behaviors and job satisfaction

Napier and Ferris (1993) identified three aspects of distance between leaders and followers: physical, structural, and psychological. A number of authors had argued that physical distance may negatively affect how well leaders would be able to work with their followers due to a potential reduction in the quality of interactions between leaders and followers (Bass, 1998; Howell and Hall-Merenda, 1999; Yagil, 1998; Bass and Avolio, 1990). Howell and Hall-Merenda (1999) found that transformational leadership at closer levels produced significantly higher follower performance than transformational leadership at a distance.

We generally psychological distance equate to social distance (Napier and Ferris, 1993). Antonakis and Atwater (2002) defined social distance in the leadership domain as perceived differences in status, rank, authority, social standing, and power, which affect the degree of intimacy and social contact that develop between followers and their leader.

Shamir (1995) pointed out that the relationship between socially close and distant leaders is important because of determining the level at leader's outcomes. Dvir and Shamir (2003) ever argued that the difference in the information followers was about their distance and close leaders may contribute to the differential impact of leadership on followers. Leaders would have few opportunities not only to build relationships but also to communicate with followers, and this might result an effect of follower's performance because of high social distance between leaders and followers.

Based on the above arguments, we expect that social distance might have a negative impact on job satisfaction.

H_{2a}: Social distance will negatively moderate the relationship between transformational leadership and job satisfaction when social distance is low rather than high.

H_{2b}: Social distance will negatively moderate the relationship between transactional leadership and job satisfaction when social distance is low rather than high.

METHODOLOGY

Sample and procedure

The participants for this research were from 43 electronics companies and included both engineers and administrative staff. Participants in this study were voluntary, and were given a written guarantee by the authors that their individual responses would be confidential. A total of 307 questionnaires were sent to the respondents with envelopes provided by the authors. The returned rate was 90%, with the result of completed data for 266 participants. The sample totally consisted of 135 male and 131 female, with an average age of 31.74 years old. The educational level of the sample was predominantly university graduates or MA graduates, accounting for 72.9 and 18.0% respectively. The average of

Table 1. Means, standard deviations and correlations.

Variable	Mean	S.D.	1	2	3	4	5
1. Social distance	2.98	0.59	(0.805)				
2. Transformational leadership	3.60	0.65	-0.20**	(0.929)			
3. Transactional leadership	3.27	0.51	-0.22**	0.78**	(0.702)		
4. Job satisfaction	3.31	0.53	-0.24**	0.58**	0.50**	(0.647)	
5. Task performance	3.23	0.62	-0.29**	0.58**	0.47**	0.71**	(0.778)

** $p < 0.01$; (Parenthesis shows alpha reliability values of variables).

organizational tenure was 5.7years

Instruments

Leadership behaviors

This study adopted 32 items from Multifactor Leadership Questionnaire (MLQ) Form 5x to measure transformational and transactional leadership, transformational leadership included idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration; transactional leadership including contingent rewards and management by exception active (Bass and Avolio, 1997). The transformational leadership questionnaire CFA was acceptable ($\chi^2 = 13.463$, $df = 5$, $p = 0.019$, $RMSEA = 0.08$, $GFI = 0.981$, $AGFI = 0.944$, $CFI = 0.993$, $IFI = 0.986$, $NFI = 0.989$, Standardized RMR = 0.008, Cronbach's alpha = 0.929), and transactional leadership was also acceptable ($\chi^2 = 12.78$, $df = 5$, $RMSEA = 0.077$, $GFI = 0.981$, $AGFI = 0.943$, $CFI = 0.972$, $IFI = 0.972$, $NFI = 0.955$, Standardized RMR = 0.029, Cronbach's alpha = 0.702)

Job satisfaction

This study adopted 5 items developed by Janssen and Van (2004) to measure job satisfaction (sample item: All in all, the chance your job gives you to do what you are best at). With response options of 1 represents strongly disagree, 2 represents disagree, 3 represents neither disagree nor agree, 4 represents agree, 5 represents strongly agree ($\chi^2 = 17.582$, $df = 5$, $RMSEA = 0.097$, $GFI = 0.975$, $AGFI = 0.924$, $CFI = 0.928$, $IFI = 0.93$, $NFI = 0.905$, Standardized RMR = 0.032, Cronbach's alpha = 0.647)

Task performance

We used 4 items developed by Cammann et al. (1983) to measure of task performance (I perform on my profession well). With response options of 1 represents strongly disagree, 2 represents disagree, 3 represents neither disagree nor agree, 4 represents agree, 5 represents strongly agree. ($\chi^2 = 2.031$, $df = 2$, $RMSEA = 0.008$, $GFI = 0.996$, $AGFI = 0.981$, $CFI = 0.92$, $IFI = 0.91$, $NFI = 0.993$, Standardized RMR = 0.011, Cronbach's alpha = 0.778).

Social distance

According to the definition of Antonakis and Atwater (2002), social distance in the leadership domain could be described as perceived differences in status, rank, authority, social standing, and power that affect the degree of intimacy and social contact that developed between followers and their leaders to developed 4 items. (Sample item: I feel distance because of leaders' authority). The ratings were

completed on five-point Likert Scale with 1 represents very far, 2 represents far, 3 represents neither far nor close, 4 represents close, and 5 represents very close). ($\chi^2 = 12.832$, $df = 2$, $RMSEA = 0.143$, $GFI = 0.978$, $AGFI = 0.89$, $CFI = 0.969$, $IFI = 0.97$, $NFI = 0.964$, Standardized RMR = 0.022, Cronbach's $\alpha = 0.805$),

RESULTS

The results of the SPSS 12.0 analysis of the hypothesis test with the correlations, hierarchical regression for the mediating and moderating variables in this study are presented in this section.

Table 1 presented the means, standard deviations and correlations of the research variables. As shown, task performance was correlated with transformational leadership, transactional leadership and social distance ($\gamma = 0.58$, 0.47 and -0.29 , $p < 0.01$). The result also showed the task performance had a positive relationship with transformational leadership, transactional leadership but had a negative relationship with social distance. Moreover, job satisfaction had a positive relationship with transformational leadership, transactional leadership ($\gamma = 0.58$ and 0.50 , $p < 0.01$) but had a negative relationship with social distance ($\gamma = -0.24$, $p < 0.01$).

Tables 2 and 3 presented that hierarchical regression analysis result. Transformational leadership and transactional leadership significantly effects task performance ($\beta = 0.583$, and 0.475 , $p < 0.001$). In sum, the greater transformational leadership and transactional leadership, the more willing employees were to display task performance.

In testing the mediating effects, the three-step regression procedure, as suggested by Baron and Kenny (1986), was used to determine whether or not job satisfaction is a mediating variable of the relationship between transformational leadership, transactional leadership and task performance. To support for mediation, the following conditions must hold: (1) The independent variable (transformational leadership and transactional leadership) affects the mediating variable (job satisfaction); (2) The independent variable (transformational leadership and transactional leadership) affects the dependent variable (task performance); and (3) After the inclusion of the mediating variable (job satisfaction) into the second regression equation of the previous step, the regression

Table 2. Regression analyses of job satisfaction mediating transformational leadership on task performance.

Step	Independent variable	Dependent variable	β	Adjusted R ²
1	Transformational leadership	Job satisfaction	0.585***	0.340
2	Transformational leadership	Task performance	0.583***	0.337
3	Transformational leadership	Task performance	0.252***	0.546
	Job satisfaction		0.565***	

***p<0.001.

Table 3. Regression analyses of job satisfaction mediating transactional leadership on task performance.

Step	Independent variable	Dependent variable	β	Adjusted R ²
1	Transactional leadership	Job satisfaction	0.496***	0.234
2	Transactional leadership	Task performance	0.475***	0.223
3	Transactional leadership	Task performance	0.161**	0.524
	Job satisfaction		0.632***	

p<0.01; *p<0.001; standardized regression coefficients are reported.

coefficient of the independent variable (transformational leadership and transactional leadership) is lower than the regression coefficient of the previous step, and there is a significant relationship between the mediating variable (job satisfaction) and task performance.

Step 1 in Table 2 show transformational leadership and job satisfaction had a significant relationship ($\beta=0.585$, $p<0.001$).

Step 2, A significant relationship was found between transformational leadership and task performance ($\beta=0.583$, $p<0.001$).

In step 3, when job satisfaction (the mediation) was included to the above regression model, and job satisfaction had a significant positive relationship with task performance ($\beta=0.565$, $p<0.001$), and the regression coefficient of transformational leadership and task performance reduced from 0.583 to 0.252 ($p<0.001$).

This demonstrated that job satisfaction was mediating variable of the relationship between transformational leadership and task performance. Hypothesis 1a was supported.

Similarly, as seen in Table 3, job satisfaction was a mediating variable of the relationship between transactional leadership and task performance (β reduced from 0.469 to 0.161 $p<0.01$). Hypothesis 1b was supported.

To test our moderation effect, we used hierarchical stepwise regression following the regression procedures outlined by Baron and Kenny (1986). First, we entered transformational leadership and social distance. In step 2 we entered the cross-product term representing the anticipated moderation effect.

The changes in R² (ΔR^2) at each step and that the standardized regression coefficients are presented in

Table 4.

As shown in Table 4, the social distance would moderate the transformational leadership and job satisfaction relationship, was not significant ($\beta=-0.071$, $p>0.05$). Hypothesis 2a was not supported.

We also tested the moderation of social distance between transactional leadership and job satisfaction.

We found very different result about moderation effect on transactional leadership.

As shown in Table 5, that the social distance would moderate the transactional leadership and job satisfaction relationship, was significant ($\beta=-0.127$, $p<0.05$). Hypothesis 2b was supported.

To further interpret the interaction effect among that selected variables, we followed the procedure that recommended by Cohen et al. (2003), to create two simple regressions of dependant variables (job satisfaction) on independent variable(transactional leadership), and then given conditional values form the degree of social distance (mean ± 1 S.D.).

As shown in Figure 1, followers and leaders with high transactional leadership relationships would have higher job satisfaction when followers have low social distance with leaders.

On the contrast, followers and leaders with high transactional leadership relationships would have lower job satisfaction when followers had higher social distance with leaders.

DISCUSSION

The major goals of this study were to clarify the

Table 4. Results of regression analyses of social distance moderating transformational leadership on job satisfaction.

Variable	Job satisfaction			VIF
	Model 1	Model 2	Model 3	
Gender	0.10	0.06	0.06	1.06
Age	-0.01	-0.01	0.00	1.05
Social distance		-0.14 ***	-0.13 ***	1.07
Transformational leadership		0.55 ***	0.55 ***	1.06
Transformational leadership * social distance			-0.07	1.03
ΔR^2	0.01	0.35	0.00	
R^2	0.01	0.36	0.37	
Adjusted R^2	0.00	0.35	0.36	
F	1.32	71.93***	1.80	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; Notes: standardized regression coefficients are reported.

Table 5. Results of regression analyses of social distance moderating transactional leadership on job satisfaction.

Variable	Job satisfaction			VIF
	Model 1	Model 2	Model 3	
Gender	0.097	0.082	0.076	1.06
Age	-0.013	-0.012	-0.002	1.05
Transactional leadership		0.457***	0.458***	1.06
Social distance		0.153**	-0.127*	1.11
Transactional leadership * social Distance			-0.127*	1.05
ΔR^2	0.01	0.02	0.02	
R^2	0.01	0.27	0.29	
Adjusted R^2	0.00	0.26	0.27	
F	1.32 ***	7.86 **	5.53 *	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; Notes: standardized regression coefficients are reported.

relationships between leadership and task performance as well as to investigate the mediating role of job satisfaction on leadership and task performance relationship. Besides, we also examined the moderating role of social distance on the leadership and job satisfaction. Transformational and transactional leadership were found to have significant positive relationship with task performance. The relationship between transformational leadership and task performance was higher than the relationship between transactional leadership and task performance.

The findings of the significant effect on transformational and transactional leadership was consistent with the research result of Li and Hung (2009), Ruggieri (2009), Yang (2009) and Shen and Chen (2007) The greater transformational and transactional leadership an employee perceived, the more likely it was that an employee would display task performance. The β value of transformational leadership ($\beta = 0.583$) was higher than transactional leadership ($\beta = 0.475$). Transformational leaders effected employees to display more task performance than transactional leaders do.

Moreover, this study used job satisfaction as the role of mediator between leadership and task performance. The results showed that job satisfaction was a mediating variable in the relationship between transformational, transactional leadership and task performance. This demonstrated that leadership is a critical position. It triggers employees to fulfill job satisfaction, and in turn caused them to display task performance.

Another goal was to examine that social distance moderates the relationship between leadership and followers' outcomes (job satisfaction and task performance). The results were not consistent with our expectation, and the social distance was not moderating the relationship between transformational leadership and job satisfaction.

But social distance moderated significantly the relationship between transactional leadership and task performance. Our explanation for this finding was that transactional leadership involved a social exchange process where the leader clarified what the followers must do as their part of a transaction (complete the task successfully) to receive a reward or to avoid a of

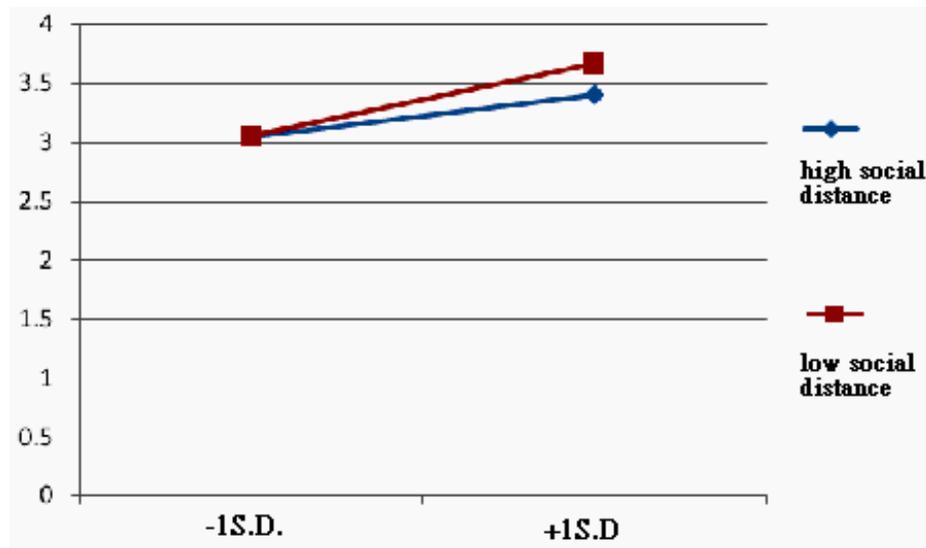


Figure 1. Moderating role of social distance on transactional leadership and job satisfaction.

punishment (satisfaction of the followers' needs) that might be contingent on the fulfillment of the transaction (satisfying the leader's needs), including contingent reward, active management and passive management (Bass and Avolio, 1997; 1994; Avolio and Bass, 1995; Bass, 1990). Howell and Hall-Merenda (1999) reported that trust between followers and close leaders is higher than between followers and distant leaders because close leaders have more opportunities to interact directly, establish personal contact, and build relationships. They also found that transformational leadership at closer levels produced significantly higher follower performance than transformational leadership at a distance.

According to social exchange of Leader-Member Exchange (LMX) Theory, supervisors should select material or non-material resources to make exchange with subordinates (Liden et al., 1997). Managers may also share or withhold valuable information when interacting with subordinates, or may choose to engage in mentoring or other socio-emotional interactions (Graen and Scandura, 1987; Graen, Liden, and Hoel, 1982). Similarly, subordinates may also offer resources that were valued by managers, such as by making an extra effort, displaying greater resolution to performing their supervisors' goals, or by demonstrating greater organizational commitment (Graen and Uhl-Bien, 1995). Transactional leadership was a behavior that satisfies the job need of followers.

Dvir and Shamir (2003) argued that the difference in the information followers have about their distant and close leaders may contribute to the different impact of leadership on followers. Shamir (1995) contended that physically close leaders have a greater opportunity to show individualized consideration, sensitivity to followers' needs, and support for the development of employees.

Transactional leadership was influenced by social distance because transactional leaders built their leader-member exchanges based on the distance between them and their followers. Nevertheless, transformational leaders sincerely devote themselves to the followers and inspire their followers to perform; therefore, social distance did not moderate the relationship between transformational leadership and job satisfaction or job performance. Bass and Avolio (2000) pointed that transformational leadership style usually generates higher performance than transactional leadership. Transformational leadership is not affected by contingency, space or human factors; its influence is far more reaching than transactional leadership.

Conclusion

The present study makes a significant contribution to the existing body of knowledge in the field of leadership and task performance by providing support for the mediating role of job satisfaction and the moderating role of social distance in the relationship between the leadership behaviors and followers' task performance. The present study also demonstrates that transformational leaders effect followers to display more task performance than transactional leaders do.

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Full Length Research Paper

Enhancing performance through merger and acquisition or strategic alliances? In knowledge innovation based

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This paper investigates the relationships among merger and acquisition (M&A), strategic alliances and organizational performance. This paper compares the influences of M&A and strategic alliances from 1993 to 2008 on both stock price and trading volumes of underlying stock around the announcement date on Taiwan stock market. The empirical results indicate a strong relationship between strategic alliance event and SCAR and SCAV in electronics industries. The SAV results for M&A events are positive and significant for non-electronics industries, and there is a strong relationship between M&A event and SCAR and SCAV. Furthermore, among the listed companies, the SAV results for M&A events and strategic alliance event are positive and significant, and there is positive effect in SCAR and SCAV for M&A events, and there is also positive effect in SCAV for strategic alliance events.

Key words: Merger and Acquisition, strategic alliance, trading volumes, stock price, knowledge innovation.

INTRODUCTION

In knowledge innovation-based environments, those businesses that can master knowledge and technology will be able to gain a competitive edge (Alam, 2009). An organization must respond quickly to all changes in its external environment, be able to handle large amounts of complex information, use new technology, and have proactive thinking and innovation for the most effective management of knowledge (Yeh, Lai and Ho, 2006; Lin and Tseng, 2005; Wadhwa, Rao, Chan, 2005; Wei, Choy and Yeow, 2006; Gottschalk, 2006).

To enhance competitiveness, enterprises strive to create innovative knowledge approaches (Huang and Lin, 2006; Darroch, 2002; Porter and Scott, 2001; Wong, 2005) in order to enhance performance (Beheshti, 2004). Therefore, knowledge management capabilities and knowledge innovation have become important topics for improving business performances (Yang and Yu, 2002;

Wadhwa, Bhoon, and Chan, 2006; Lin and Kou, 2007; Ho, 2008; Omerzel and Antonc'ic, 2008).

Individual companies cannot provide all the knowledge resources necessary to operate. Companies are forced to choose a cooperative coexistence business model to replace the traditional mutual competitiveness (Alam, 2009). Therefore, enterprises must have a sound business strategy to cope with foreign competition and challenges, and the ability to recognize and adopt new opportunities in order to continue in a leading position (Lin, Wang and Chen, 2009).

In order to adapt to changes in the environment, high-tech industries have, through horizontal and vertical integration, gained cross-sector combinations, or other forms of strategic alliances; such expanded scale of production maintains business competitiveness (Alam et al., 2009). As enterprises grow, they tend to generate economies of scale through external growth methods, such as M&A or strategic alliance (Porter, 1985). Lewis (1990) proposed that, when faced with resources, risks, and control demands, M&A and strategic alliance are important rapid growth strategies to achieve maximized shareholder

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equity.

Although M&A and strategic alliance can integrate R&D strengths and achievements of enterprises in order to obtain external resources and external growth strategies, they may have positive or negative impact on business performance. No consensus has been reached in the verification of past literature (Cassiman, Colombo, Garrone and Veugelers, 2005). Although, M&A and strategic alliance may create positive economic impact on the enterprises, it may also create negative rivalry, transfer of benefits, or have indirect and adverse affects on investors or creditors.

Some scholars advocate that M&A integrates the R&D strengths of the acquirer and the target company, which enhances R&D innovation investments and achievements after integration (Ahuja and Katila, 2001; Prabhu, Chandy and Ellis, 2005). However, other scholars argue that, to improve market force after a M&A, redundant resources will be abolished for reduced investment by the enterprise in R&D innovative activities (Ernst and Vitt, 2000; Hitt, Hoskisson, Johnson, Moesel, 1996), and thus, M&A does not create value for an enterprises, and may even result in damage to the corporate value (DeLong, 2001; Houston, James and Ryngeart, 2001).

In the past, enterprises used M&A to achieve business growth, however, current investment-laws and regulations governing M&A are relatively more complex compared with strategic alliance. The reactions of employees and management issues in cases of strategic alliance are less severe than M&A. However, as the involvement of strategic alliance is not as high as M&A, in addition to low frequency of interactions, it may lead to difficulties in internalization of external knowledge (Karim and Mitchell, 2000; Makadok, 2001).

Discussions in literature and empirical studies on knowledge innovation have failed to define the impact relationships of M&A and strategic alliances on business performances. Therefore, this study plans to discuss and compare Taiwan's electronic industry as subjects, as well as the impacts of M&A and strategic alliance on business performance, on the basis of knowledge innovation.

Whether M&A and strategic alliance can create values for shareholders has been a topic of considerable concern in global capital markets. Many past scholars have pointed that, both M&A and strategic alliance can create unique and hard-to-imitate comprehensive effects, which generate relatively long standing competitive advantages, as well as positive abnormal returns for the enterprises (Harrison et al, 2001; Jensen and Ruback, 1983; Jarrell and Poulsen, 1989; Schwert, 1996; Cotter, Shivdasani, and Zenner, 1997; Akhigbe, Borde, and Whyte, 2000; Billett, King, and Mauer, 2004; Fee and Thomas, 2004; Spyros and Georgia, 2007; Travlos, 1987).

In addition, stock prices and share trading performances of an enterprise are subject to investors' expectations of business performance after M&A or strategic alliance. Therefore, analysis of the stock price and share

trading volume will allow better understanding of the real benefits of the two strategies of business operations. Therefore, this paper infers that, both M&A and strategic alliance can generate abnormal returns, as well as considerable enhancements to stock trading volume and stock prices.

LITERATURE REVIEW

The connection of knowledge innovation with M&A and strategic alliance

Innovation in information technology promotes the development of a knowledge economy, making knowledge a major factor in the manufacturing processes of an enterprise. High-tech industries are knowledge-intensive industries, with competitiveness growing from the accumulation, creation, and application of knowledge. To avoid a rigidity of core technological capabilities of an enterprise, moderation of external resources that activate knowledge basics and the ability to pursue innovation are necessary conditions for continuity in high-tech enterprises.

In addition, R&D investments cost large amounts of capital, and the life cycle of high-tech products tends to be relatively short; therefore, high-tech products generated from internal R&D often result in an inability to take advantage of the expected benefits due to a high attrition rate. Hence, through M&A, enterprises often directly access R&D resources, technologies, knowledge, and achievements of a target companies to strengthen and build innovation capabilities and core competencies, as well as establishing durable competitive advantages (Anand and Khanna, 2000; Helfat and Peteraf, 2003).

M&A is an important strategic operation acquired through the external growth of an enterprise (Glueck, 1979; Pricewaterhouse Coopers, 2005, 2007). It enables the enterprise to expand business and technological scopes, change original paths of learning, overcome rigid core crisis, integrate internal resources and external learning opportunities, and it is the best way to create dynamic capabilities for an enterprise (Eisenhardt and Martin, 2000; Karim and Mitchell, 2000; Seth, Song, and Pettit, 2002).

In addition to comprehensive benefits through complementary combinations of M&A (Hoskisson, Hitt, Wan and Yiu, 1990; Krishnan, Joshi, and Krishnan, 2004; Chung, Singh, and Lee, 2000), the processes of M&A will enable the enterprise to integrate learning resources, reconfigure resources, and regroup internal and external resources (Teece, Pisano and Shuen, 1997). It contributes to increased constructs of competitiveness for the enterprise and improves business operational efficiency (Harrison, Hitt, Hoskisson and Ireland, 2001).

After M&A, an enterprise can construct and promote a combined learning and knowledge database from the two

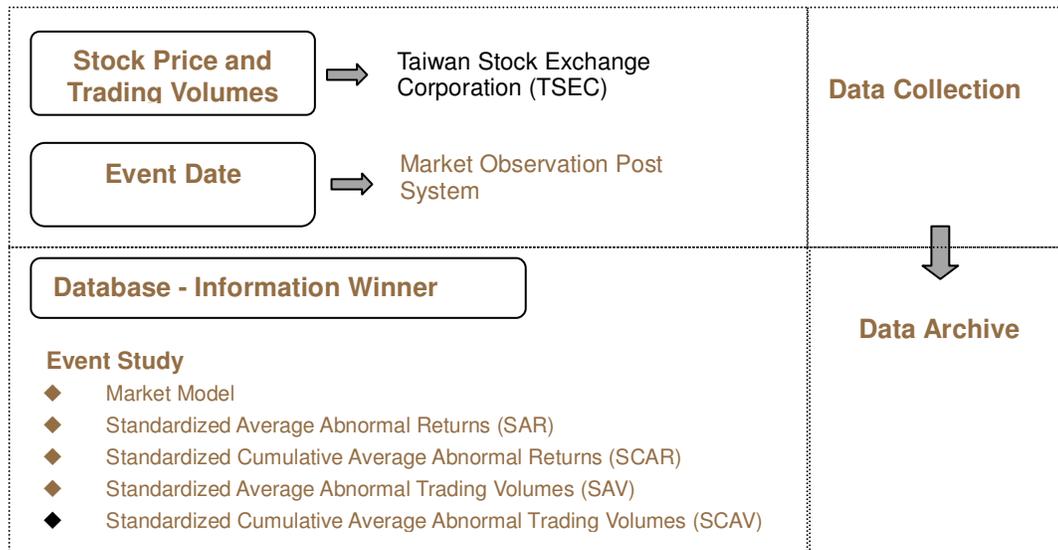


Figure 1. The research of system process.

parties (Helfat and Peteraf, 2003; King, Dalton, Daily, Covin, 2004). Through resource transfers, the acquirer and the target company combine resources, which enable both parties to increase external technical support on the basis of the existing capabilities (Szulanski, 2000; Seth et al, 2002; Chung et al, 2000). At the same time, some enterprises conduct cross-organizational cooperation through strategic alliance to obtain external resources and knowledge. Strategic alliance is a key strategic choice, which links activities of the companies strategies (Porter and Fuller, 1986) to ensure, maintain, or enhance competitive advantages (Harrigan, 1988).

For mutual needs, risk pooling, and cooperation of common goals (Lewis, 1990), it is a commitment maintained through mutually beneficial processes and interdependence (James, 2001). Through strategic alliance, enterprises exchange knowledge with partners, and then, integrate it into its own organization, which is also an effective way to strengthen the competitive advantage of an enterprise. Hence, numerous high-tech companies take advantage of M&A and strategic alliances to obtain external R&D capabilities and achievements for external growth (Puranam, Singh and Zollo, 2006; Smith, 1991).

METHODOLOGY

Sample selection

The purpose of this study is to discuss the differences on impact statements of M&A and strategic alliance on stock prices and stock trading volumes between 1993 and 2008. The data are taken from company trading information and major information published in the "Market Observation Post System" of the Taiwan Stock Exchange, and data matrix subject to the declaration date of M&A and

strategic alliance.

Regarding the data of listed company M&A samples, there are a total of 110 initial screening samples, with 39 samples are deleted due to insufficient estimation periods or the data are not applicable. There are 81 merger and acquisition sample companies remaining; upon the removal of non-electronic companies, 53 electronic companies remain as samples of this study.

Regarding strategic alliance data, there are 100 initial screening samples, with 24 samples deleted due to insufficient estimation periods, and 16 samples are removed due to improper data, 60 companies of strategic alliance remaining; upon removal of non-electronic samples, 54 electronic companies of strategic alliance are chosen as samples of this study.

This study executes tests to determine whether there is any related information effects on the M&A and strategic alliance occurring near the announcement date, a described event study is performed. The event date is defined as the announcement date of M&A and strategic alliance, and the announcement date of information disclosure, namely Day 0. The event window of interest begins from Day -15 and ends on Day +15.

Research design

This investigation adopted event study (Brown and Zhang, 1997) to explore stock price whether it will receive the influence of the specific event. The method had already been applied extensively in the finance and the accounting research domain, on the research approach of the real example so far, still plays a very important role. The research of system process and framework is shown in Figure 1.

Probing into the stock price will declare to enterprises M&A and strategic alliance change the response of information, the expected return was derived using the market model where the model parameters α and β were obtained from the estimation period,

namely $R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$, where R_{it} indicates the expected return on stock i on trading day t and R_{mt} denotes the return on the market portfolio on day t . α_i is the intercept, β_i is the systematic risk of individual stock and ε_{it} residuals is the

component of returns which is abnormal or unexpected. Abnormal returns on stock i on day t (AR_{it}) are calculated for a reference period surrounding the event date. These are obtained as the difference between the observed returns and those predicted by the market model

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \quad (1)$$

Next, we compute the average abnormal returns for day t as $\overline{AR}_t = \frac{1}{N} \sum_{i=1}^N AR_{it}$, where $t = -15, -14, \dots, 0, \dots, 14, 15$. The cumulative average abnormal returns (CAR_t) through τ days ($\tau = \tau_2 - \tau_1$) for a portfolio of N stocks can be calculated as:

$$CAR_t(\tau) = \frac{1}{N} \sum_{t=\tau_1}^{\tau_2} \sum_{i=1}^N AR_{it} \quad (2)$$

The standardized cumulative average abnormal returns (SCAR) will start from special date τ_1 accumulate to the τ_2 day in event period, it may obtain the SCAR, the event period of the SCAR from the τ_1 to the τ_2 total t day, namely

$$SCAR(\tau) = \frac{1}{N} \sum_{t=\tau_1}^{\tau_2} \sum_{i=1}^N \frac{AR_{it}}{S_{it}} \quad (3)$$

Where τ indicates event date from the τ_1 to τ_2 as a examination period.

The standardized residual cross-sectional method ignores estimation period estimates of variance, thus, this paper uses the standardized residual cross-sectional for its t -test. The resulting of t -test statistic for AR_{it} is

$$t_{SROCSM}^{AR} = \frac{\frac{1}{N} \sum_{i=1}^N SAR_{iE}}{\sqrt{\frac{1}{N(N-1)} \sum_{i=1}^N \left(SAR_{iE} - \frac{\sum_{i=1}^N SAR_{iE}}{N} \right)^2}} \quad (4)$$

The t -test statistic for the CAR_t for standardized residual cross-sectional is calculated as

$$t_{SROCSM}^{SCAR} = \frac{SCAR(\tau_1, \tau_2)}{\sqrt{\frac{1}{N(N-1)} \sum_{i=1}^N \left(SCAR_i(\tau_1, \tau_2) - \frac{\sum_{i=1}^N SCAR_i(\tau_1, \tau_2)}{N} \right)^2}} \quad (5)$$

Where, $SCAR_i(\tau_1, \tau_2) = \sum_{E=\tau_1}^{\tau_2} SAR_{iE}$

Certain empirical results have an association between abnormal returns and abnormal trading volumes. Hence, stock trading volumes around announcement date was inspected. Trading turnover rate is substituted for trading volumes (Vol_{it}) in studies.

Daily trading turnover rate for stock i on day t is defined as:

$$Vol_{it} = \frac{\text{Number of shares traded}_{it}}{\text{Number of shares outstanding}_{it}} \quad (6)$$

Where $t = -106, -105, \dots, -16$.

Normal trading volumes ($NVol_i$) for stock i are defined as the average trading turnover rate of the stock as estimated for the 90 days prior to the event window, namely;

$$NVol_i = \frac{1}{90} \sum_{t=-106}^{-16} Vol_{it} \quad (7)$$

By average trading turnover rate (AV_t) before the event window, AV_t can be compared across different stocks of various sizes. Therefore, the AV_t for a portfolio of N stocks on day t is calculated as:

$$AV_t = \frac{1}{N} \sum_{i=1}^N \frac{Vol_{it}}{NVol_i} \quad (8)$$

Where $t = -15, -14, \dots, 15$.

The abnormal trading volumes ($AVol_t$) in percentage terms on day t for a portfolio of N stocks and its standard deviation (SD) can be calculated as $AVOL_t = AV_t - 1$,

$$SD = \sqrt{\frac{1}{31} \sum_{t=-15}^{15} (AV_t - \overline{AV})^2} \quad (9)$$

Where, $\overline{AV} = \frac{1}{31} \sum_{t=-15}^{15} AV_t$

RESULTS

This section debates the empirical results for stock price and trading volumes for electronics industries, non-electronics industries and whole listed companies.

Table 1 uses the t -test statistics to examine the standardized average abnormal returns (SAR) and standardized average abnormal trading volumes (SAV) that appear in the event window from Days -15 to +15. For enterprises announcing M&A, the results demonstrate positive SAR and SAV, 0.1661 and 0.3822, for days -12 and 0, with the results being statistically significant at the 0.05 and 0.01 levels using the t -test. For strategic alliances, the results indicate positive SAR, 0.3503 and 0.2482 for days -1 and 13 and negative SAR, -0.2395, for day -10, with the results being statistically significant at 0.05 level by t -test. However, a significant and positive response is found for SAV, for days -11, -2 to 1, 3, 6 to 8, 13 and 15. Hence, the results indicate that if an electronics industry announces a strategic alliance, industry trading volumes will increase. Summing up the above results, the information effect of strategic alliances is significantly in SAV.

Table 2 shows the information effect of disclosure M&A and strategic alliance plans in the event window for

Table 1. SAR and SAV around announcement date of M&A and Strategic alliance for electronics companies.

Event window	M&A		Strategic alliance		Event window	M&A		Strategic alliance	
	SAR	SAV	SAR	SAV		SAR	SAV	SAR	SAV
-15	-0.0203	-0.0684	0.1880	0.0778	0	-0.0308	0.3822**	0.1502	0.8071**
-14	-0.0519	0.0742	0.0365	0.1087	1	-0.0273	0.1982	-0.1075	0.4792**
-13	0.0893	0.0471	0.1152	0.1301	2	-0.0352	0.1431	-0.0491	0.2698
-12	0.1661*	0.0533	0.2172	0.2861	3	-0.0186	-0.0747	-0.1488	0.4043*
-11	0.0299	0.0175	0.1186	0.5035*	4	-0.0610	-0.1212	0.0529	0.4541
-10	0.0912	0.0148	-0.2395*	0.1968	5	-0.0148	0.0147	0.0561	0.4605
-9	0.0173	0.1432	-0.0457	0.1350	6	0.0781	0.2274	0.1641	0.5710*
-8	0.0671	0.1442	0.1408	0.3804	7	-0.0341	0.0344	0.0916	0.5205**
-7	-0.0375	0.1991	-0.0292	0.0146	8	0.0401	0.3002	0.0918	0.6472**
-6	0.0265	0.1460	-0.0763	-0.0231	9	-0.0081	0.0984	-0.0914	0.2365
-5	0.0923	0.1033	0.1920	-0.0620	10	0.0082	0.2049	-0.0970	0.2689
-4	0.0396	0.0595	0.0813	0.0540	11	0.0194	0.0685	0.1720	0.1143
-3	0.0904	0.2391	0.2184	0.4271	12	-0.0076	0.0374	-0.0189	0.1625
-2	0.0922	0.2664	0.1970	0.6410*	13	-0.0309	-0.0268	0.2482*	0.4478*
-1	-0.0102	0.2309	0.3503**	0.6817**	14	-0.0856	0.1188	-0.0166	0.6317
					15	-0.0024	0.1226	0.0520	0.4436*

The * (**) denotes statistical significance at the 0.05 (0.01) level; the *t-value* uses Standardize Residual Cross-Sectional Method to test.

Table 2. SCAR and SCAV around announcement date of M&A and strategic alliance for electronics companies.

Event window	M&A		Strategic alliance		Event window	M&A		Strategic alliance	
	SCAR	SCAV	SCAR	SCAV		SCAR	SCAV	SCAR	SCAV
-15	-0.0203	-0.0684	0.1880	0.0778	0	0.6511*	2.0525	1.6148**	4.3586**
-14	-0.0722	0.0058	0.2244	0.1865	1	0.6238*	2.2507	1.5073*	4.8379**
-13	0.0171	0.0530	0.3396	0.3166	2	0.5886	2.3938	1.4582*	5.1076**
-12	0.1832	0.1063	0.5568*	0.6026	3	0.5700	2.3191	1.3094*	5.5120**
-11	0.2131	0.1238	0.6754*	1.1061	4	0.5089	2.1979	1.3623	5.9660**
-10	0.3043	0.1386	0.4360	1.3029	5	0.4942	2.2126	1.4183	6.4265**
-9	0.3216	0.2818	0.3903	1.4379	6	0.5723	2.4401	1.5824*	6.9975**
-8	0.3887	0.4260	0.5311	1.8183	7	0.5382	2.4745	1.6740*	7.5180**
-7	0.3512	0.6251	0.5019	1.8329	8	0.5783	2.7747	1.7658*	8.1651**
-6	0.3777	0.7711	0.4255	1.8098	9	0.5703	2.8731	1.6744*	8.4016**
-5	0.4699	0.8744	0.6175	1.7478	10	0.5784	3.0779	1.5774	8.6705**
-4	0.5095*	0.9339	0.6988	1.8018	11	0.5978	3.1465	1.7494*	8.7848**
-3	0.5999*	1.1730	0.9172	2.2289	12	0.5901	3.1839	1.7304*	8.9473**
-2	0.6921**	1.4394	1.1142*	2.8699*	13	0.5593	3.1572	1.9787*	9.3951**
-1	0.6819*	1.6703	1.4645*	3.5515*	14	0.4736	3.2760	1.9620*	10.0267**
					15	0.4712	3.3986	2.0141*	10.4703**

The * (**) denotes statistical significance at the 0.05 (0.01) level; the *t-value* uses Standardize Residual Cross-Sectional Method to test.

electronics industries. This investigation adopts standardized cumulative average abnormal returns (SCAR) and standardized cumulative average abnormal trading volumes (SCAV) to determine the reaction strength of M&A and strategic alliances around the event period. The empirical results by this study reveal statistically significant and positive SCAR in the event window for days -4

to 1. Thus it can be inferred that M&A news leak-age exerts a sustained influence on the stock market. For strategic alliance events, the empirical evidence indicates positive SCAR for days -12, -11, -2 to 3, 6 to 9, and 11 to 15, which is statistically significant at the 0.05 level based on *t-test*. Furthermore, there is positive SCAV for days -2, -1 and 0 to 15, which is statistically significant at the 0.05

Table 3. SAR and SAV around announcement date of M&A and Strategic alliance for non-electronics companies.

Event window	M&A		Strategic alliance		Event window	M&A		Strategic alliance	
	SAR	SAV	SAR	SAV		SAR	SAV	SAR	SAV
-15	0.0673	0.0094	-0.0329	0.0720	0	0.1655	0.7275**	0.1747	0.6617
-14	0.0633	0.1959	0.1117	0.1824	1	0.0863	0.6724**	-0.0345	0.1638
-13	-0.0438	0.1200	-0.1422	0.1276	2	-0.1340	0.5150**	-0.2206	0.0864
-12	0.0136	0.0618	0.0203	0.0538	3	-0.0660	0.5327**	0.0300	-0.0457
-11	0.0583	0.1840	-0.1092	-0.1133	4	0.1694*	0.4340**	-0.2364*	-0.1585
-10	0.0507	0.1773	0.1372	0.0516	5	0.1110	0.4665**	-0.0584	-0.0972
-9	0.0664	0.1672	-0.0501	0.0061	6	0.1060	0.4838**	0.2616	0.4319
-8	0.0221	0.3096*	-0.0408	0.2329	7	0.0733	0.3999**	0.1168	0.2721
-7	0.1077	0.3342*	-0.2504*	-0.0221	8	-0.0582	0.3173**	-0.1984	0.1877
-6	-0.0122	0.3093*	0.1060	0.0726	9	-0.0401	0.3081*	-0.1730	0.3220
-5	0.0109	0.2566*	-0.1621	-0.0635	10	-0.0555	0.3401	-0.0568	0.3056
-4	0.0313	0.4143**	0.2318*	0.1282	11	-0.0574	0.3523	0.2283	0.4292*
-3	0.0216	0.4757**	0.0840	0.2685	12	0.0093	0.4177**	-0.2171	0.2830
-2	0.0607	0.4131**	0.0446	0.1674	13	0.0136	0.2660*	-0.0072	0.1279
-1	0.0148	0.5180**	0.2132	0.2419	14	0.0268	0.1197	-0.1094	0.1479
					15	-0.0116	0.2535	0.2200	0.3616

The * (**) denotes statistical significance at the 0.05 (0.01) level; the *t-value* uses Standardize Residual Cross-Sectional Method to test.

and 0.01 levels using the *t-test*. The empirical results indicate a strong relationship between strategic alliance event and SCAR and SCAV.

For non-electronics industries, the results of the SAR and SAV lists in Table 3 demonstrate statistically significant and positive SAV around the M&A event divulgence date for days -8 to 9 using the *t-test*. Corporate law stipulates that convener convened board of directors of the director and supervisor and states the matter clearly seven days prior. Owing to inside information being disclosed ahead of time, industry declares that M&A events result from reaction to trading volumes. Furthermore, SAR is positive and statistically significant, with a value of 0.1694, on day 4. The empirical results listed in Table 3 show that message disclosure of strategic alliances have statistically significant and negative SAR, of -0.2504 and -0.2364, for days -7 and 4, and have statistically significant and positive SAR, of 0.2318, for day -4. The results reveal positive and abnormal trading volumes around the strategic alliance announcement date, 0.4292, for day 11. Therefore, SAV around announcement date of strategic alliance for non-electronics industry is insignificant. Overall, the SAV results for M&A events are positive and significant.

According to the results of Table 4 show, for M&A events, positive SCAR is observed for days 0, 1, 4 to 10. The SCAV for the event window from -8 to 15 shows statistically significant at the 0.05 and 0.01 levels. Thus, before disclosure of M&A information for non-electronics industries, trading volumes can increase, indicating that investors maintain an optimistic attitude and results from market trading volumes increase continuously. The

empirical results indicate a strong relationship between M&A event and SCAR & SCAV. For strategic alliance events occurring in non-electronics industry, standardized cumulative average abnormal returns and standardized cumulative average abnormal trading volumes were shown not to be affected; namely, no strong relationship was identified between two SCAR and SCAV. Thus investor behavior appears not to be influenced by strategic alliance announce during the event window.

Table 5 lists the results for SAR, SAV and the related *t-test* statistics for whole listed companies of stock and trading volumes in the event window around the M&A and strategic alliance announcement date. For M&A events of whole listed industry, the empirical evidence indicates positive SAR, 0.0921, for day 6, which is statistically significant at the 0.05 level using the *t-test*. Moreover, SAV is positive and statistically significantly on days -8 to 10 and day 12. For strategic alliance announcement events, the empirical result found that the positive SAR 0.1504, 0.2088, 0.1978, for days -4, 6, 11 is statistically significant at the 0.05 level by *t-test*. Statistically markedly shows the positive SAV for days -8, -3 to 1, 6 to 8, 11, 13 and 15. Overall, the SAV results for M&A events and strategic alliance event are positive and significant.

Table 6 lists SCAR, SCAV and their *t-test* statistics for whole listed companies of stock price and trading volumes in the event window around the M&A and strategic alliance announcement date. For M&A events, the research results of event window reveal positive SCAR for days -10 to 15 by *t-test*. Statistically significantly shows the positive SCAV for days -8 to 15. Substantially, when M&A information had leaked to the market, stock price

Table 4. SCAR and SCAV around announcement date of M&A and Strategic alliance for non-electronics companies.

Event window	M&A		Strategic alliance		Event window	M&A		Strategic alliance	
	SCAR	SCAV	SCAR	SCAV		SCAR	SCAV	SCAR	SCAV
-15	0.0673	0.0094	-0.0329	0.0720	0	0.6980*	4.6740**	0.3359	2.0679
-14	0.1306	0.2052	0.0787	0.2545	1	0.7843*	5.3463**	0.3014	2.2317
-13	0.0868	0.3252	-0.0635	0.3821	2	0.6503	5.8613**	0.0808	2.3181
-12	0.1003	0.3870	-0.0431	0.4359	3	0.5843	6.3940**	0.1108	2.2724
-11	0.1586	0.5710	-0.1523	0.3226	4	0.7537*	6.8280**	-0.1256	2.1138
-10	0.2093	0.7483	-0.0151	0.3742	5	0.8647*	7.2946**	-0.1840	2.0166
-9	0.2757	0.9156	-0.0651	0.3803	6	0.9708*	7.7784**	0.0776	2.4485
-8	0.2978	1.2252*	-0.1059	0.6132	7	1.0441**	8.1783**	0.1944	2.7205
-7	0.4055	1.5594*	-0.3563	0.5911	8	0.9859*	8.4957**	-0.0040	2.9082
-6	0.3932	1.8687*	-0.2503	0.6637	9	0.9457*	8.8038**	-0.1770	3.2302
-5	0.4042	2.1253*	-0.4124	0.6002	10	0.8902*	9.1439**	-0.2337	3.5359
-4	0.4354	2.5396*	-0.1806	0.7284	11	0.8328	9.4962**	-0.0055	3.9650
-3	0.4570	3.0153**	-0.0966	0.9968	12	0.8421	9.9139**	-0.2226	4.2480
-2	0.5177	3.4284**	-0.0520	1.1643	13	0.8557	10.1799**	-0.2298	4.3759
-1	0.5325	3.9464**	0.1612	1.4062	14	0.8825	10.2996**	-0.3392	4.5239
					15	0.8709	10.5531**	-0.1193	4.8854

The * (**) denotes statistical significance at the 0.05 (0.01) level; the *t-value* uses Standardize Residual Cross-Sectional Method to test.

Table 5. SAR and SAV around announcement date of M&A and Strategic alliance for whole listed companies.

Event window	M&A		Strategic alliance		Event window	M&A		Strategic alliance	
	SAR	SAV	SAR	SAV		SAR	SAV	SAR	SAV
-15	0.0237	-0.0285	0.0865	0.0751	0	0.0677	0.5596**	0.1615	0.7378*
-14	0.0059	0.1367	0.0710	0.1438	1	0.0298	0.4418**	-0.0740	0.3289*
-13	0.0225	0.0846	-0.0030	0.1289	2	-0.0848	0.3341**	-0.1278	0.1824
-12	0.0895	0.0577	0.1268	0.1754	3	-0.0424	0.2373*	-0.0667	0.1899
-11	0.0441	0.1030	0.0140	0.2096	4	0.0547	0.1640*	-0.0799	0.1621
-10	0.0708	0.0983	-0.0665	0.1276	5	0.0484	0.2468**	0.0035	0.1947
-9	0.0419	0.1556	-0.0477	0.0736	6	0.0921*	0.3592*	0.2088*	0.5047**
-8	0.0445	0.2292**	0.0574	0.3101*	7	0.0198	0.2222*	0.1032	0.4021**
-7	0.0354	0.2685**	-0.1307	-0.0029	8	-0.0093	0.3090*	-0.0414	0.4282**
-6	0.0071	0.2299*	0.0074	0.0225	9	-0.0242	0.2061*	-0.1289	0.2773
-5	0.0514	0.1821*	0.0294	-0.0627	10	-0.0238	0.2744*	-0.0785	0.2864
-4	0.0354	0.2418**	0.1504*	0.0893	11	-0.0192	0.2143	0.1978*	0.2643*
-3	0.0559	0.3606**	0.1567	0.3515*	12	0.0008	0.2328*	-0.1099	0.2199
-2	0.0764	0.3418**	0.1270	0.4153*	13	-0.0085	0.1236	0.1310	0.2954*
-1	0.0024	0.3784**	0.2874**	0.4721*	14	-0.0292	0.1193	-0.0592	0.4011
					15	-0.0070	0.1898	0.1291	0.4045*

The * (**) denotes statistical significance at the 0.05 (0.01) level; the *t-value* uses Standardize Residual Cross-Sectional Method to test.

and trading volumes are clearly influenced. The empirical results presented in this study demonstrate the positive SCAR around the strategic alliance event disclosure date, 0.8661, 1.0276, 0.9537 and 0.9947 for days -1 to 1 and 7 using the *t-test*. For strategic alliance announcement events, the result presented in this study

demonstrate positive SCAV for days -2, 1, days 0 to 15, which is statistically significant at the 0.05 and 0.01 levels by *t-test* respectively. To sum up, the empirical results presented that there is positive effect in SCAR and SCAV for M&A events, and there is positive effect in SCAV for strategic alliance events.

Table 6. SCAR and SCAV around announcement date of M&A and Strategic alliance for whole listed companies.

Event window	M&A		Strategic alliance		Event window	M&A		Strategic alliance	
	SCAR	SCAV	SCAR	SCAV		SCAR	SCAV	SCAR	SCAV
-15	0.0237	-0.0285	0.0865	0.0751	0	0.6746**	3.3992**	1.0276*	3.2669**
-14	0.0296	0.1083	0.1575	0.2189	1	0.7044**	3.8410**	0.9537*	3.5958**
-13	0.0521	0.1928	0.1546	0.3478	2	0.6196**	4.1751**	0.8258	3.7782**
-12	0.1416	0.2505	0.2814	0.5232	3	0.5772*	4.4125**	0.7591	3.9681**
-11	0.1857	0.3535	0.2954	0.7327	4	0.6318*	4.5765**	0.6792	4.1302**
-10	0.2566*	0.4518	0.2289	0.8603	5	0.6802**	4.8233**	0.6827	4.3249**
-9	0.2985*	0.6074	0.1812	0.9339	6	0.7724**	5.1825**	0.8915	4.8296**
-8	0.3430*	0.8366*	0.2386	1.2440	7	0.7922**	5.4046**	0.9947*	5.2317**
-7	0.3784*	1.1050*	0.1079	1.2411	8	0.7829**	5.7136**	0.9533	5.6599**
-6	0.3855*	1.3350*	0.1152	1.2636	9	0.7588**	5.9198**	0.8244	5.9371**
-5	0.4369*	1.5170**	0.1446	1.2009	10	0.7350*	6.1941**	0.7459	6.2235**
-4	0.4723*	1.7588**	0.2950	1.2902	11	0.7158*	6.4084**	0.9437	6.4879**
-3	0.5282**	2.1194**	0.4518	1.6417	12	0.7166*	6.6412**	0.8338	6.7078**
-2	0.6046**	2.4612**	0.5788	2.0571*	13	0.7081*	6.7648**	0.9647	7.0031**
-1	0.6069**	2.8396**	0.8661*	2.5291*	14	0.6789*	6.8841**	0.9055	7.4043**
					15	0.6719*	7.0740**	1.0346	7.8088**

The * (**) denotes statistical significance at the 0.05 (0.01) level; the *t-value* uses Standardize Residual Cross-Sectional Method to test.

Conclusion

Fiercely competitive of these days and fast-changing environment shortens product life cycles, prompting enterprises to recognize that effective management and operation of knowledge has become a very important topic, as knowledge innovation is strength in competition (Huang and Lin, 2006; Wadhwa, Bhoon, and Chan, 2006).

The result in this paper finds M&A can help save costs and achieve economies of scale among the same industry, and the acquiring firm requires fewer resources to integrate the difference with organization, creating a corporate M&A effect and increasing investor investment willingness. Strategic alliances are characterized by elasticity, lower risk and smaller capital requirements, particularly in the case of electronic companies which frequently use strategic alliances to enter new markets, invest in new talent and improve their manufacturing ability.

Based on the findings, it is known that when faced with the pressures of knowledge innovation, enterprises will choose M&A or strategic alliance to learn, build, and add innovation to knowledge. However, investors prefer M&A as the response strategy. The possible reason may be that, strategic alliance is established based on specific goals, which may cause cooperative processes to be lacking in flexibility (Das and Teng, 2000), and when the alliance goals are achieved, the partners will end the alliance; therefore, alliance is often relatively short-lived (Hatfield and Pearce, 1994). On the contrary, in M&A, the acquirer and target company can learn and duplicate technological capabilities of each other to enhance the

knowledge basis of both parties (Seth et al., 2002). Therefore, as far as the enterprise is concerned, on the basis of knowledge innovation, M&A can be regarded as the best method of organizational learning and innovation (Eisenhardt and Martin, 2000; Karim and Mitchell, 2000; Seth et al., 2002).

In recent years, governments have developed enterprise M&A laws to promote large-scale enterprises to adopt this method in an attempt to expand the economies of scale of enterprises and enhance business performances, thus maintaining proper competitive environments for improving business performances. It is recommended that enterprises should first understand the nature of M&A, and then adopt a proper M&A model in order to effectively integrate the enterprises, and generate comprehensive benefits from M&A.

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Full Length Research Paper

The trend and growth implications of bank recapitalization in Nigeria

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One of the major macroeconomic variables that compliment bank performances is availability of capital. Economic theories show that inadequate capital contributes to bank failures and retards economic growth. This study however, examined the trend and the growth implications of bank capitalization in Nigeria. The secondary data used for the study were processed using sample test technique for difference between two means and the E-view for windows electronic packages. The test of difference of mean helped us to compare the means of the variables before and after recapitalization to see if there is any significant difference between the two periods. The findings showed that there is a significant difference between the two means and hence the two periods. The result indicated that post recapitalization mean at 21.58 is higher than the pre recapitalization mean of 15.09, implying that banks are more adequately capitalized and less risky after the programme. This result also indicated that recapitalization has low but significant influence on the growth of Nigerian economy compare to other variables in the model. The study strongly supported the need for the government to sustain the recapitalization policy.

Key words: Bank, recapitalization, economic growth, basle agreement, globalization.

INTRODUCTION

Globally, the activities of banks reflect their unique roles as the engine of growth in any economy. This role which comes from both banks and non-banks financial intermediaries and the regulatory framework in stimulating economic growth is widely recognized especially in developmental economies. Uboh (2005) set the pace for the landslide of other works on the interdependent and the relationship between banks and economic growth. Stressing further, the pioneering work of Gurley and Shaw (1956) on the relationship between real and financial developments shows that financial intermediaries, monetization and capital formation determine the path and pace of economic growth and development of any country. Nevertheless these pivotal roles have not been highly noticeable in Nigeria. The scenario arises as a result of poor performances of Nigerian commercial banks. According to Soludo (2004), "The Nigeria banking system today is fragile and marginal. The system faces enormous challenges which if not addresses urgently, could snowball into a crisis in the near future". Soludo

identified the problems of the banks, especially those seen as feeble, as persistent illiquidity, unprofitable operations and poor asset base.

Imala (2005) posited that the objectives of banking system are to ensure pure stability and facilitate sustained rapid economic development. Regrettably, these objectives have remained largely unattained in Nigeria as a result of some deficiencies in the banking system. This phenomenon has necessitated continuous financial sector reforms globally. In 1988, an international agreement among the banking authorities known as Basle agreement was reached. The main objective of this international agreement is to apply a common set of rules for capital adequacy in order to minimize the risk of bank failures. In compliance with the Basle agreement, the former governor of Central Bank of Nigeria Professor Charles Soludo announced on July 6, 2004 that the banking sector should increase their capital base with about 100% (from initial capital base of ₦2 million to a whopping ₦25 billion). The policy directives of this

initiative according to the C.B.N governor are *ita alia*:

- (i) To strengthen the commercial banks there by intensifying the growth of the economy.
- (ii) To be tuned with the global requirement of minimize capitalization of \$500 million
- (iii) To encourage competition locally and internationally in conformity with the new trend of globalization.

The kernel of this argument is that with this new policy of recapitalization, banks that cannot meet the required amount will have to merge with the bigger or stronger ones. Following the implementation of the policy, an unprecedented process of recapitalization has taken place in Nigerian banking sector shrinking the number of commercial banks from 89 - 25 banks. No other event is more challenging as this recapitalization policy in the history of Nigeria banking. Prior to the reformation, the state of the Nigerian banking sector was very weak. It was fragile and marginal being plagued by persistent illiquidity, unprofitable operations, poor asset base and intermittent failures. It was expected that the reform should promote efficiency, better banking performance, operational stability, profitability and reduce bank failures. According to Amala (2005), the current structure of the banking system has prompted tendencies towards banking effectiveness and efficiency particularly at the retail level. But the questions to ask for which answers should be sought are: Has recapitalization achieved its stated objectives? Has it encouraged competition locally and internationally with the new trend of globalization? Has it strengthened the commercial banks and stimulated the growth of Nigerian economy? This study was inspired to investigate these hypotheses and determine the effectiveness of recapitalization policy on the operational performances of commercial banks and the magnitude of its impact on the growth of Nigerian economy. The rest of this paper is organized as follow. The study reviews the literatures covering origin, determinants, trends, importance and economic implications of bank recapitalization in Nigeria, after which it briefly introduces and discusses the research methodology. Furthermore, it shows the data analysis, interpretation of result and discussions. Finally, it summarizes the findings, draws policy recommendations and concludes the paper.

LITERATURE REVIEW

The origin, determinants, trends, importance and implications of bank recapitalizations has been scantily discussed in the literature. Soyinbo and Adekanye (1992) and Adam (2003), traced recapitalization to take its roots from bank failures. According to them, most banks in Nigeria failed as a result of inadequate capital base, mismanagement of funds, overtrading, lack of regulation and control; and unfair competition from the foreign

banks. Thus, recapitalization is one of the banking reforms to tackle these problems. According to Omoruyi (1991), recapitalization appears to be the main driving force of bank reforms. It focuses mainly on restructuring, rebranding and refurbishing the banking system to accommodate the challenges of bank liquidation. Obviously, adequate capital base is very crucial to the success of any bank. Apart from its multiplier effect on the economy as a whole; it acts as a buffer and security for banks. As Spong (1990) put it, "commercial bank must have enough capital to provide a cushion for absorbing possible loan losses, funds for its internal needs, and expansion and added security for depositors. Adequate capital increases the confidence and financial state of stock holders. Bank regulators view it as an important element in holding government banking risks to an acceptable level.

Demircuc-kunt and Levine (2003) argued that recapitalization drives bank consolidation (mergers and acquisitions) so that increased concentration goes hand-in-hand with efficiency improvements, Boyd and Runkle (1993), Sulaiman (2004) and Imala (2005) buttressed this argument. They stressed further that consolidated banking system enhances profits efficiency, and lower bank fragility. More importantly, high profits arising from this provides a buffer against adverse shocks and increases the franchise value of the banks.

Turning to the effectiveness of recapitalization and its over all economic implications, authors like Boyd and Runkle (1993), Peek and Nosengree (1998), Allen and Gale (2000), Gelos and Roldos (2002), Sani (2004), Adetiloye (2006), Onaolapo (2008) and Adegbayi et al. (2008) have made some empirical contributions. In his analysis Onaolapo (2008) employed CAMEL rating system to examine the effectiveness of recapitalization. Onaolapo found that recapitalization has improved the financial health of the banks. Onaolapo discovered that the percentage of sound bank has reached the highest point of 70% as at 2006. This finding was collaborated by Sani (2004). Using a regression model, Sani discovered a positive and significant relationship between recapitalization policy and economic growth in Nigeria. To the contrary, Adegbaju (2008) examined the effectiveness of recapitalization on the performances of 20 Nigerian banks. He discovered that while few banks recorded appreciable improvements in their performances, majority of the banks remain the same or even worse off.

So far, the nexus among recapitalization policy, financial stability and economic growth has been examined by two polar schools of thoughts. The proponents of bank recapitalization believe that increased capital base has potentially increased bank returns through revenue and cost efficiency gains. On the other hand, the opponents argued that recapitalization has increased bank's propensity toward risk taking through increases in leverage and off balance sheet operations. There is therefore a divergence views on the effectiveness and growth

Table 1. Minimum paid-up capital banks in Nigeria (1952 - 2005).

Year	Type of bank	Minimum account (£)
1952	Commercial Banks	12,500.00
1969	Commercial Banks	300,000.00
		(N)
1979	Commercial Banks	600,000.00
	Merchant Banks	2,000,000.00
1988 (February)	Commercial Banks	5,000,000.00
	Merchant Banks	3,000,000.00
1988 (October)	Commercial Banks	10,000,000.00
	Merchant Banks	6,000,000.00
1989	Commercial Banks	20,000,000.00
	Merchant Banks	12,000,000.00
1991	Commercial Banks	50,000,000.00
	Merchant Banks	40,000,000.00
1997	Commercial Banks	500,000,000.00
	Merchant Banks	500,000,000.00
2000	Commercial Banks	1,000,000,000.00
	Merchant Banks	1,000,000,000.00
2001	Commercial Banks	2,000,000,000.00
	Merchant Banks	2,000,000,000.00
2005	Commercial Banks	25,000,000,000.00

Source: Admimorah, C. I. (1988); FBN Business Report, June 2005.

implications of recapitalization policy. The empirical evidences are equally not unanimous on the matter. However, this study attempts to clarify the arguments and determine using appropriate tools of economic analysis the pre and post recapitalization performance of the banks as well as the direction, extent and magnitude of the impact of recapitalization on the overall economic performance in Nigeria.

Historical literature of bank recapitalization in Nigeria

Table 1 shows the trend of bank recapitalization in Nigeria. It demonstrated the minimum paid up capital in Nigeria historically since 1952, when the first "banking ordinance" was passed.

The first round of recapitalization was in 1952, when the colonial government then raised the capital requirement for banks especially the foreign commercial banks to 12,500 pounds. Ever since then, the issue of banks recapitalization has been a continuous occurrence not only in Nigeria, but generally around the world especially as the world continues national economies.

In 1969, the paid-up capital was increased from £12,500 - £300,000.00. In 1979 when Merchant bank came on board the Nigeria banking authority set the capital base for Merchant banks at N2 million and N600,000.00 for commercial bank. As from 1988, there had been further increase in the capital base, particularly coupled with the liberalization of the financial system and introduction of structural adjustment programme in 1986. In February 1988, the capital base for commercial banks was increased to N5 million while that of Merchant banks was increased to N3 million. In 1989, there was a further increase to N20 m for commercial banks and N12 m for Merchant banks.

In recognition of the fact that well-capitalized banks would strengthen the banking system for effective monetary management, the monetary authority increased the minimum paid-up capital of commercial and merchant banks in February 1991 - N50 and N40 million from N20 million, respectively. In 31st March, 1997 twenty-six banks comprising 13 each of commercial and merchant banks were liquidated as a result of bank failures. In January, 1998 the minimum paid-up capital of merchant and commercial banks was consequently raised to a

uniform level of N500 million. Finally in year 2005, the central bank of Nigeria brought into force the risk-weighted measure of capital adequacy recommended by the Basle Committee of the Bank for international settlement and raised the paid-capital to N25 billion.

METHODOLOGY

Here the methodology and theoretical significance of the study are discussed. Issues relating to the choice of research design and strategies, model specification, data requirements and sources, the nature and scope of data collected, the data processing technique and the theoretical significance of parameter estimate are discussed. The models were adjudged reliable before they were used. The components of the model were defined and a prior expectation of the relationship among the variables explained for the purpose of giving the reviewers and users a deep insight into the phenomenon under study.

Research design and strategies

The study used quasi-experimental research design approach for the data analysis. This approach combines theoretical consideration (a prior criterion) with the empirical observation and extracts maximum information from the available data. It enables us therefore, to observe the effects of explanatory variables on the dependent variables.

Data requirement and sources

Given the nature of the model, it is imperative that the data that will permit the estimation of the stochastic equations representing the implications of bank recapitalization on bank performances and economic growth can be collected. These include: Gross domestic output growth rate, bank capitalization; volume of bank asset; aggregate savings; investment, capital to risk-weighted asset ratio; profit before tax; liquidity ratio and ratio of non-performing loans to total loans. Time series data were used for the study. The data were obtained from Central Bank of Nigeria (CBN) annual statistical bulletin and National Bureau for statistics (NBS).

Data processing techniques

The secondary data used for the study were processed using sample test technique for difference between two means and the E-view for windows electronic packages. The test of equality of mean helps us to compare mean of the variables before and after recapitalization to see if there is any significant difference between the two means. The decision rule is to reject H_0 (that there is no significant difference) and accept H_1 if the calculated "t*" is greater than the table value at 5% significant level. Where t^* is less than the 5% critical region, the study accepts H_0 and reject H_1 . The E-view for windows electronic packages helps us to test the implications of bank recapitalization on economic growth. This package is suitable because it is time efficient in terms of output and adequacy of statistics generated.

Model specification

Recapitalization and bank performance model

Sample test technique for difference between two means shall be

used in modeling the first hypothesis. The test is to ascertain whether the means of the two populations are different from each other. The bank performance ratios shall be divided into two samples A and B. Comparative analysis of the ratios in each sample is then made coupled with a test of equality of mean for the periods before and after recapitalization. The means for capital to risk-weighted asset ratio (CRAR); profits before Tax (PBT); liquidity ratio (LIQ) and ratio of non-performing loans to total loans (NPL) are tested for the periods before and after recapitalization using T-test .

$$t^* = \frac{X_1 - X_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

Where: X_1 = Mean of ratio in sample A, X_2 = Mean of ratio in sample B, σ = Variance
N = Number of observations.

Recapitalization and economic growth model

This model is set to examine the growth implication of bank recapitalization. It attempts to establish a linkage between increase in bank capitals, volume of asset, aggregate savings and investment. It also showed how these variables impact on economic growth. The model is expressed mathematically as:

$$GDP = f(CAP, AST, SAV, INV) \quad (1)$$

Where: GDP = Real gross domestic product (dependent variable), CAP = Bank capitalization, AST = Volume of Bank Asset, SAV = Aggregate Savings, INV = investment.

Putting in a linear and stochastic form, Equation (1) can be written explicitly as:

$$GDP_t = \theta_0 + \theta_1 CAP_t + \theta_2 AST_t + \theta_3 SAV_t + \theta_4 INV_t + u_i \quad (2)$$

The variables remain as previously defined, u_i is the white noise term with the usual stochastic assumption. Parameter θ_0 is the constant intercept and the θ_i 's (where $i = 1, 2, 3, 4$) are the regression coefficients to be estimated.

DATA ANALYSIS, INTERPRETATION OF RESULTS AND DISCUSSION

Table 2 shows the pre and post situation for the various bank performances ratios in Nigeria, following three years before 2001 to 2003, and three years after 2005 to 2007, using Reinhart and Tokatlidis (2000) and Rose and Hudgins (2005) approaches.

Table 3 shows the paired sample T test, while appendix shows the computation of capital adequacy, profit before tax (PBT), liquidity (LIQ) and asset quality

Table 3 presents the estimates of the t-test model. As shown by the statistics in the table, the explanatory power of the estimate is very high judging from statistical significance of the mean-value and the associated standard deviations. The capital to risk asset ratio (CRAR) for post recapitalization mean which stood at 21.58 is higher than the pre recapitalization mean of 15.09, implying that banks are more adequately capitalized and less risky after the 2005. The critical region under two-tail test is

Table 2. Banking industry performance (2001 to 2007).

Year	Capital to risk asset ratio (CRAR)	Profit before tax (PBT)	Liquidity ratio (LIQ)	Non performing loan (NPL)
2001	n.a	96	63.9	16.9
2002	14.78	86	56.7	21.27
2003	15.41	74	64.6	20.45
2005	21.25	81	66.5	18.12
2006	22.6	108	75.1	7.92
2007	20.9	407	70.8	7.39

Source: CBN and NDIC bank supervision annual reports (2001 to 2007). Year 2004 was used as the recapitalization base year). Tables 2 show the pre and post situation for the various bank performances ratios in Nigeria following three years before (2001 to 2003) and three years after (2005 to 2007) and using Reinhart and Tokatlidis (2000) and Rose and Hudgins (2005) approaches.

2.77 (that is $t(0.05) = 2.77$) and the calculated t^* value is 11.32. Since the calculated t^* is greater than the table value at 5%, the study concluded that, there is a significant difference between the means of the two populations. The implication of the result is that banks after recapitalization are more credit worthy and reliable. The probability of liquidation and collapsing is very low.

For profit before tax (PBT), the pre recapitalization mean is 85.33 with a standard deviation of 11.0 while the post capitalization mean is higher at 198.66 but with poor standard deviation of 180.9. The implication of the result is that banks earned higher profit after recapitalization than the pre earning strength. However, the differences are not statistically significant due to the high standard error. The critical region $t(0.05) = 2.77$ under two tail test and calculated t^* value is 1.08. Since the calculated t^* falls within the acceptance region we conclude that the difference is not significant at 5%. The case of liquidity ratio follows the same trend with the capital to risk asset ratio (CRAR). The post recapitalization mean 70.84 is greater than the pre capitalization mean of 61.73 and the t^* show that the difference between the two mean at 0.5 level is significant. This implies that the bank after recapitalization find it much easier to convert asset into ready cash and meet their obligation to customer at call. The critical region $t(0.05) = 2.77$ under two tail test and Calculated t^* value is 3.36. Since the calculated t^* is greater than the table value at 5%, we conclude that, there is a significant difference between the means of the two populations.

Finally for asset quality ratios, the post recapitalization mean which stood at 11.77 is lower than pre capitalization mean of 19.54, the ratio of non performing asset to total loan reduce by 7.77 indicating a 40% decrease in the quality of bank asset. The implication of the result is that there is a significant deterioration in the quality of asset after recapitalization. Nevertheless the critical region $t(0.05) = 2.77$ under two tail test and the calculated t^* value is 2.87. Since the calculated t^* is greater than the table value at 5%, the study concluded that, there is a significant difference between the means of

of the two populations.

Recapitalization and economic growth model

The purpose of this subsection is to establish relationship that exists between recapitalization and economic growth as well as testing the significant of the relationship. This study enabled us to validate the second hypothesis using the variables in the Table 4 we shall model the impact of pre recapitalization.

The coefficient of the multiple determination R^2

The coefficient of the multiple determination stood at 0.96 (96%). This means that the explanatory variables: Bank capitalization, asset, saving and investment accounted for 96% of the total changes in the dependent variable (GDP). This is a good fit.

The standard error

The values of the standard error for the entire variables in the model show that the parameters estimate were statistically significant. These values were less than half of the values of the coefficient of the variables.

The F-statistics

The F-statistics test was also carried out to test for stability in the regression parameter coefficient when sample size increases, as well as the overall significance of the estimated regression model. Thus, we compare the calculated F with the critical value at 5% level (0.05) at $K - 1$, (that is $(4 - 1 = 3)$ and $N - K = 28 - 4 = 24$ degree of freedom) for the model.

Where K = the number of parameter estimated, and N = the number of the observed years. If $F > F_{0.05}$, we reject the null and accept the alternative hypothesis, and if

Table 3. Paired sample t-test.

Pair	Sample A		Sample B		Mean difference	Calculated t*	Critical region t (0.05)
	Mean	Std. Dev	Mean	Std. Dev			
CRAR	15.09	0.44	21.58	0.89	6.49	11.34.	2.77
PBT	85.33	11.01	198.66	180.92	113.33	1.08	2.77
LIQ	61.73	3.37	70.84	3.27	9.11	3.36	2.77
NPL	19.54	2.32	11.14	4.49	8.4	2.87.	2.77

Source: Result obtained from author's computation.

Table 4. Data Estimation result dependent variable: GDP, Method: Least Squares, Date: 04/11/10, Time: 03:36, Sample (adjusted): 1990, 2008, Included observations: 19 after adjusting endpoints.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	266698.9	8979.128	29.70209	0.0000
CAP	0.005769	0.001760	3.278148	0.0055
AST	0.100489	0.023122	4.346050	0.0007
SAV	-0.159994	0.041130	-3.889985	0.0016
INV	0.026943	0.003559	7.570881	0.0000
R ²	0.973456	Mean dependent var		391905.7
Adjusted R ²	0.965874	S.D. dependent var		141030.2
S.E of regression	26052.82	Akaike info criterion		23.39457
Sum squared resid	9.50E+09	Schwarz criterion		23.64311
Log likelihood	-217.2485	F-statistic		128.36644
Durbin-Watson stat	1.837536	Prob(F-statistic)		0.000000

Source: Author's computation.

if otherwise we accept the null hypothesis and reject the alternative hypothesis. From the statistical table, $F_{0.05}$ at (4, 21) degree of freedom is 3.01 while estimated F^* is 128. Obviously $F^* > F_{0.05}$. This shows that variation in the gross domestic output in Nigeria could be attributed to changes in the independent variable.

The Durbin–Watson statistics

The test for the presence of autocorrelation was performed by making use of the Durbin Watson statistics. The Durbin Watson statistics is 1.8. This was found to be within the normal region which falls within the determinate region of the study that is $(1.5 < DW < 2.5)$ and imply that there is negative first order serial autocorrelation among the explanatory variables.

The error correction term (ECM)

It was included in the model to capture the long run dynamics between the co-integrating series is correctly signed (negative) and statistically significant. The coefficients indicated adjustment of 95% for the model. These adjustments imply that errors are corrected within one

year with a high speed. The ECM also reveals a long run relationship between explanatory and dependent variables in each model.

Bank capitalization

It was correctly and positively signed. It is also statistically significant. The expected outcome of this coefficient is a positive one. The implication of this result is that, 1% rise in bank capitalization will cause as much as 5% growth in the gross domestic output. Some author found a negative relationship between the growth in economy's output and bank capitalization.

Savings variable

It was negatively signed, but statistically significant. The implication of this result is that though a negative relationship exists between savings and GDP growth rates, it does contribute significantly to the long run of output growth in Nigeria.

Bank asset

It was positively signed and statistically significant. It is

seen as contributing more to national output than other variables. The implication of this result is that, 1% rise in bank asset will cause as much as 10% growth in the gross domestic output.

Investment

It was correctly and positively signed. It is also statistically significant. The expected outcome of this coefficient is a positive one. The implication of this result is that, 1% rise in domestic investment will cause as much as 2% growth in the gross domestic output.

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

This paper investigated the growth implications of bank recapitalization in Nigeria. Stochastic economic model was used on Nigeria time series data. The long run stability of the variable was tested and it was found that the data were stationary and co integrated. The study carried out comprehensive literature reviews and found that there was no consensus among the researchers on the impact of bank capitalization on the growth of Nigerian economy. While some agree with short run positive implications, some other submitted entire negative growth implications. An error correction test was performed to detect the speed of adjustment to equilibrium in case of sudden chock. The outcome of the test showed that bank capitalization has a positive relationship with output growth in Nigeria. The impact is of a low magnitude. Among other variables included in the model, bank capitalization accounted for just 5% of the total variation in the output growth.

The implementation of the recapitalization policy has cause an unprecedented process of revival and resuscitation of the Nigerian banking sector shrinking the number of commercial banks from 89 - 25 banks. No other event is more challenging as this recapitalization policy in the history of Nigeria banking. Our conclusion therefore, is that recapitalization is good for Nigerian banking sector. What remains however, is how the country should maintain and review the capitalization upward from time to time in order to sustain the tempo of the revival and stability in the banking sector? In other words, the banking sector together with its complementary institutions should be strengthened and bank failures should be adequately tackled.

The monetary authority has a lot of roles to play in order to maximize the benefits of recapitalization. Primarily, the Central Bank should demonstrate sincerity

and transparency in the enforcement of the recapitalization code of conduct. Furthermore, efforts should be made with more vigor at ensuring consistency in policy objectives and instrument through a good implementation strategy as well as good sense of discipline, understanding and cooperation between the Central Bank and the Federal Government.

Furthermore, thorough supervision and control along with firm disciplines by the Central Bank over the commercial is required for the effectiveness of the policy initiatives. In addition to this, policy framework should be put in place to improve the quality of bank management, bank security along with reduction in fraudulent and sharp practices in the banking sector.

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APPENDIX**Capital adequacy**

$$t^* = \frac{15.09 - 21.58}{\sqrt{\frac{(0.44)^2}{3} + \frac{(0.89)^2}{3}}} = \frac{6.49}{\sqrt{\frac{0.1936}{3} + \frac{0.79212}{3}}}$$

$$t^* = 11.34$$

Profit before tax (PBT)

$$t^* = \frac{85.33 - 198.66}{\sqrt{\frac{(11.01)^2}{3} + \frac{(180.92)^2}{3}}} = \frac{113.33}{\sqrt{\frac{121.2}{3} + \frac{3273.2}{3}}}$$

$$t^* = 1.08$$

Liquidity (LIQ)

$$t^* = \frac{61.73 - 70.84}{\sqrt{\frac{(3.37)^2}{3} + \frac{(3.27)^2}{3}}} = \frac{9.11}{\sqrt{\frac{11.35}{3} + \frac{10.67}{3}}}$$

Asset quality

$$t^* = \frac{19.54 - 11.14}{\sqrt{\frac{(2.32)^2}{3} + \frac{(4.49)^2}{3}}} = \frac{8.4}{\sqrt{\frac{5.38}{3} + \frac{20.2}{3}}}$$

$$t^* = 2.87.$$

Full Length Research Paper

Achieving green outsourcing performance in uncertainty

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The international business environments advocate green outsourcing performance (GOP) as fundamental enablers and criteria for the competitiveness of original equipment manufacturing (OEM) firms. Few studies providing integrated competitive advantages, enablers and criteria (called measures), exist, and are suitable for practical adoption to enhance GOP. This study presents an original approach to identify the most appropriate method that firms should implement, starting from competitive advantages to internal processes in an intensive market. The approach is based on quality function deployment (QFD), and in particular, all measures with interdependence relationships are given qualitative preferences, which are rarely applied in the literature. The whole scaffold exploits fuzzy set theory and analytical network processes to translate linguistic preferences required for interdependence relationships into numerical values; the QFD translates the result into a final criteria ranking system. A case study, grounded on data available from an OEM electronic firm, is proposed and discussed to show the application of the developed tool.

Key words: Quality function deployment, green outsourcing performance, analytical network process, fuzzy set theory.

INTRODUCTION

Green outsourcing performance (GOP) evaluation of an original equipment manufacturing (OEM) firm is an on-going process that requires continuous monitoring to maintain high levels of internal process evaluation across a number of implementation enablers and criteria in the organization. Increased outsourcing of manufacturing activities has become a prominent part of the restructuring of firms' supply chains since the 1990s. Many academic and consulting firms seem to support the view of outsourcing as one of the key drivers of superior performance (Kotabe et al., 2008; Cheng and Lee, 2010). Nowadays, green practice is also an overall strategic organizational approach for designing green product and waste elimination processes due to mandated environmental orders from the European Union such as waste electrical and electronic equipment (WEEE) and

restriction of hazardous substances (ROHS) directives (Tseng et al., 2008). Therefore, an effective and structured GOP evaluation for OEM firms needs to be developed.

Without proper GOP evaluation, it is extremely difficult to exploit potential markets around the world. As a result, the increasing pace of green practices leads time, and calls for more proactive evaluation of GOPs on building up competitive advantages (Li et al., 2006; Tseng, 2010). However, GOP evaluation depends upon integrating wider enablers and criteria to lower the environmental impact of a firm. Various studies argue that manufacturing decisions and choices have to be consistent with green corporate strategy for effective environmental management (Iyer et al., 2006; Tseng et al., 2008a, 2008b; Tseng and Lin, 2008; Lee et al., 2009; Lin et al., 2010). Therefore, firms must integrate GOP enablers and criteria and enhance their competitive advantages to ensure corporate survival toward sustainable development (Tseng et al., 2008, 2009a, b; Lin et al., 2010). However

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2010). However, even fewer studies exist that deal with interdependence relationships in achieving GOP with qualitative measures to carry out measurement activities and implementation into an OEM firm.

Nevertheless, the tasks of OEM firms aim to satisfy the customer at the very beginning, which is, the green product design stage. In particular, quality function deployment (QFD) is one of these techniques for designing the needs of customers into practical measures. This approach enables firms to be proactive to customer satisfaction rather than taking a reactive position by acting on customer complaints (Karsak, 2002; Tsai et al., 2003; Bevilacqua et al., 2006). Various companies immediately adapted QFD, but it did not draw much public attention. QFD was implemented at the Kobe shipyards of Mitsubishi Heavy Industries Ltd. Although it was implemented successfully throughout Japan, it remained solely as a Japanese tool until the early 1980s. There have been studies on quantifying the planning issues of house of quality (HOQ) within the past decade, which mainly focus on customer needs. Khoo and Ho (1996), Chan et al. (1999) and Lin et al. (2010) employ fuzzy set theory to rate customer needs. Other researchers use the analytic hierarchy process (AHP) to determine the degree of importance of customer needs (Park and Kim, 1998). With QFD, OEM firms can evaluate their criteria in terms of their effectiveness in creating value for achieving GOP to develop internal capabilities necessary to improve future performance.

In addition, QFD is applied to plan and design green products. It employs cross-functional enablers to determine customer needs and translates them into green product designs through a structured analysis (Crowe and Cheng, 1996; Han et al., 1998; Chan and Wu, 2002). Hence, in real situations, cross-functional enablers are involved in interdependence relations when evaluating the GOP of an OEM firm. In view of the interdependence complexity, evaluation of GOP would anticipate multi-dimensional difficulties. Moreover, some of the qualitative measures are presented in linguistic expressions. The linguistic expressions are vague and uncertain in nature, which makes the evaluated measures with interdependence relations (called network relations) even more challenging.

The traditional statistical approach is no longer suited to evaluate proposed network QFD because the traditional approach always assumes that the enablers and criteria are independent. Yet, the evaluating firm's activities have inherent and high uncertainty and imprecision and are difficult to assess accurately with qualitative information. Previous studies have identified various evaluation methods. Kotabe et al. (2008) proposed a dynamic perspective on outsourcing strategy and its performance implications and argued that there is an optimal degree of outsourcing. The outsourcing-performance relations take on an inverted-U shape, implying that as firms deviate further from their optimal degree of outsourcing, by either

insourcing or outsourcing too much, their performance will suffer disproportionately. Chen and Lee (2009) studied how reverse logistics are increasingly crucial for the supply chain strategy of global high-tech manufacturing firms and presented a systematic approach using analytical network process (ANP) not only to investigate the relative importance of reverse logistics service requirements but also to select an appropriate third party logistics provider. Dabhiikar *et al.* (2009) presented an empirical study designed to determine factors for performance improvement when outsourcing manufacturing. They found that operations in low-cost countries can improve one performance dimension, and part characteristics and supplier operating capabilities are more important than supplier relationship strategies when outsourcing manufacturing, meaning that supplier selection trumps supplier collaboration in the make-or-buy decision. However, none of them considered the uncertain nature of qualitative preferences and voices of customers simultaneously. This study proposes to utilize fuzzy set theory, the ANP technique and QFD to achieve GOP. The ANP developed by Saaty (1996) takes into account both the relationships of feedback and dependence. In addition to these merits, ANP provides a more generalized model for decision-making without making assumptions about interdependence relations among competitive advantages, enablers and criteria (GOP measures) in qualitative preferences.

In view of qualitative preferences, fuzzy set theory can address situations that lack well-defined boundaries of activity or observation sets (Zadeh, 1965; 1975). In many practical cases, the human subjective is uncertain and qualitatively descriptive, and it is not easy to assign exact numerical values to precisely describe linguistic preferences. Linguistic terms have been used for approximate reasoning within the framework of fuzzy set theory to handle the ambiguity of evaluating data and the vagueness of linguistic expression. Hence, fuzzy set theory can express and handle vague or imprecise judgments mathematically (Al-Najjar and Alsyof, 2003; Tseng and Lin, 2008; Tseng *et al.*, 2009b). A linguistic preference is a variable whose values (namely linguistic values) have the form of phrases or sentences in a natural language (Von Altrock, 1996). Particularly, linguistic preferences are used to evaluate criteria with values that are not numbers but linguistic terms. In practice, linguistic values are commonly represented by a triangular fuzzy number (TFN). This study adopts fuzzy set theory to assess GOP using network QFD; the proposed method is called fuzzy network QFD (FNQFD). The aim of this study is to employ FNQFD to achieve GOP when measures are interdependent and uncertain. In the case study, four competitive advantages, four enablers and seventeen criteria of GOP are proposed to evaluate a firm in Taiwan. The uncertainty is mainly due to rapid changes in marketing information and human perceptions, while interdependence is mainly found in the

measures from GOP evaluation.

CONTRIBUTIONS OF THE STUDY

A first outcome from a literature analysis is that none of the approaches proposed in the literature are grounded on the FNQFD methodology. In practical cases, it would also be possible for an OEM firm to directly identify a set of suitable enablers to be implemented, without linking them with criteria and aligning them with competitive advantages. However, the risk is that the selected strategic leverages do not match marketing objectives (Cil and Evren, 1998). Moreover, QFD allows for identifying network relations and qualitative preferences among enablers and criteria, which are not examined in the methodologies available in the literature.

This study addresses two important and related measures in achieving GOP: The handling of dependence among measures is especially important for qualitative descriptions in nature; qualitative descriptions have to be transformed into a comparable scale. The crisp values must be able to compare the proposed measures and then determine the contribution of the respective measures in OEM firms. In view of the respective advantages of the proposed methods, this study attempts to propose an approach to evaluate GOP. The rationale of the proposed approach is to combine fuzzy set theory with ANP and QFD methods, wherein fuzzy set theory accounts for the linguistic vagueness of qualitative preferences, ANP converts the interdependence relations and QFD translates the voice of customers in the hierarchical structure into intelligible weights (Wu and Lee, 2007; Tseng, 2008; Tseng et al., 2009c).

METHODS

To determine the importance and performance of competitive advantages, enablers and criteria of GOP, the evaluation is structured into a two-stage analysis. The first phase is to define the decision objectives, that is, to evaluate the competitive advantages and enablers in linguistics preferences. The second phase is to analyze the enablers and criteria with the justified weights from the first phase results. However, it is necessary to generate and establish evaluation enablers and criteria based on current scenarios, which is a chain (interdependence) of competitive advantages vs. enablers and, enablers vs. criteria. Evaluations are measured by importance and performance scales obtained by; (i) assigning weights to four competitive advantages (CA_i, i = 1,2, , 4) and their associated enablers (EN_i, i = 1,2, , 4) and criteria (C_k i = 1,2, , c_k); and (ii) assessing the importance and performance rating of each competitive advantage and its associated enablers and criteria. This

study proposes a fuzzy set theory, ANP and QFD approach, followed by the proposed application procedures.

Fuzzy set theory

This section discusses how linguistic preference is expressed as the importance and performance rating for the evaluation of competitive advantages, GOP enablers, and criteria. A linguistic criterion is hard to express as an exact number, maybe a phrase or sentence expressed in a natural or artificial language. For instance, “very important” is a linguistic description; however, its value is linguistic rather than numerical. Moreover, using approximate reasoning of fuzzy set theory, the linguistic description can be represented with a fuzzy number. This study employs TFNs to represent linguistic preferences to assess GOP enablers and rate the importance of criteria. The triangular membership functions overlap, which represent the different linguistic models depending on the professional evaluator. Each qualitative competitive advantage (CA_i) and criterion (C_k) can be assessed as the degree of importance and as very low (VL), low (L), medium (M), high (H), very high (VH), and the enabler (EN_i) can be assessed as very poor (VP), poor (P), fair (F), good (G), very good (VG).

Two types of linguistic models with TFNs were constructed for fuzzy measures. The assessed values of qualitative criteria metrics are for the importance and

performance rating, $\tilde{X}_i = (L^{x_{ij}}, m^{x_{ij}}, R^{x_{ij}})$, $i = 1,2,3,4$ and $j = 1,2,3, \dots, n$. This study builds on some important definitions and notations of fuzzy set theory from Chen (1996) and Cheng and Lin (2002). Some definitions are presented thus:

Definition 1: A TFN \tilde{N} can be defined as a triplet $(l, m,$

$u)$, and the membership function $\mu_{\tilde{N}}(x)$ is defined as:

$$\mu_{\tilde{N}}(x) = \begin{cases} 0, & x < l \\ (x - l)/(m - l), & l \leq x \leq m \\ (u - x)/(u - m), & m \leq x \leq u \\ 0, & x > u \end{cases} \quad (1)$$

where $l, m,$ and u are real numbers and $l \leq m \leq u$ (Figure 1).

Definition 2: Let $\tilde{N}_1 = (l_1, m_1, u_1)$ and $\tilde{N}_2 = (l_2, m_2, u_2)$ be two TFNs. The multiplication of \tilde{N}_1 and \tilde{N}_2 is

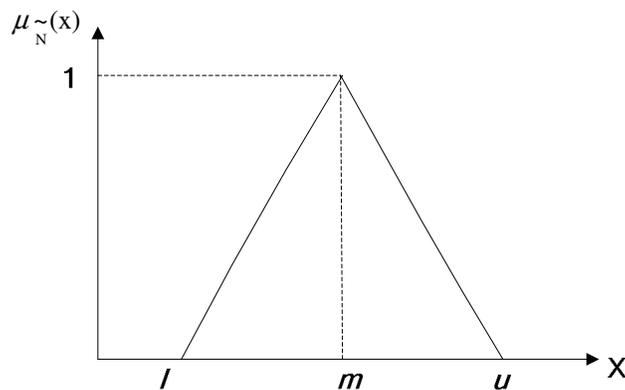


Figure 1. A triangular fuzzy number \tilde{N} .

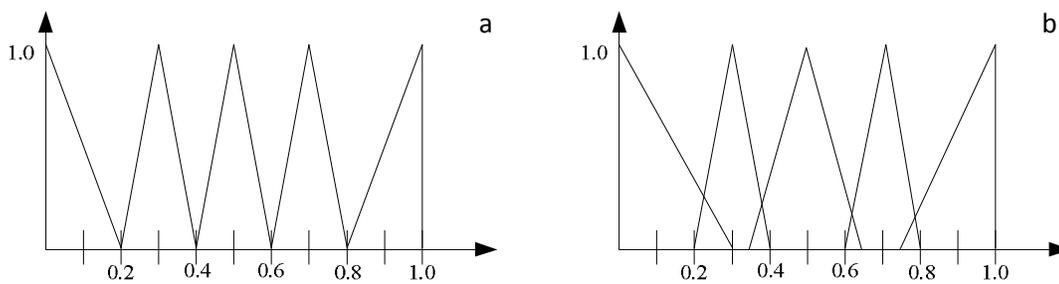


Figure 2. Linguistic models for GOP competitive advantages; (a) Criteria; performance level, (b) Enablers; importance level.

Table 1. Two linguistic models for GOP competitive advantages, enablers and criteria (importance and performance level).

(CA _i) (C _k)	TFNs	(EN _j)	TFNs
VL	(0.00, 0.00, 0.20)	VP	(0.00, 0.00, 0.30)
L	(0.20, 0.30, 0.40)	P	(0.20, 0.30, 0.40)
M	(0.40, 0.50, 0.60)	F	(0.35, 0.50, 0.65)
H	(0.60, 0.70, 0.80)	G	(0.60, 0.70, 0.80)
VH	(0.80, 1.00, 0.00)	VG	(0.75, 1.00, 1.00)

denoted by $\tilde{N}_1 \otimes \tilde{N}_2$. Multiplication of two positive TFNs, $\tilde{N}_1 \otimes \tilde{N}_2$ is approximated as

$$\tilde{N}_1 \otimes \tilde{N}_2 \cong (l_1 \otimes l_2, m_1 \otimes m_2, u_1 \otimes u_2) \quad (2)$$

The measures consist of four competitive advantages, four enablers and seventeen criteria; the measures are determined from extensive literature searches by an expert team. While the triangular fuzzy membership

functions (Table 1 and Figure 2) can accommodate the qualitative data, the evaluation process is uncertain.

To deal with the problems in uncertainty, an effective fuzzy aggregation method is required. Any fuzzy aggregation method always needs to contain a defuzzification method because the results of human judgments with fuzzy linguistic variables are fuzzy numbers.

Defuzzification refers to the selection of a specific crisp element based on the output fuzzy set, which converts fuzzy numbers into crisp values. The qualitative measures are based on Dubois and Prade (1980) fuzzy arithmetic, and the calculated aggregation is determined by k evaluators using:

$$\tilde{X}_{ij} = (\bar{x}_{ij,L}, \bar{x}_{ij,M}, \bar{x}_{ij,R}) = \left[\left(\sum_{p=1}^k x_{ij}^p \right) / k, \left(\sum_{p=1}^k x_{ij}^p \right) / k, \left(\sum_{p=1}^k x_{ij}^p \right) / k \right] \tag{3}$$

where $\tilde{X}_{ij} = (\bar{x}_{ij,L}, \bar{x}_{ij,M}, \bar{x}_{ij,R})$ are the TFNs, and x_{ij} presents at the left, middle and right positions, $\bar{x}_{ij,L}, \bar{x}_{ij,M}, \bar{x}_{ij,R}$, represents the overall average ratings of aspect i , criteria j over k evaluators, and x_{ij}^p , $p = 1, 2, \dots, k$, are the fuzzy numbers for each evaluator.

The fuzzy numbers must be transformed into crisp numbers. Many methods can achieve this transformation (for example, means of maxima, center of sum, center of gravity, and the α -cut method). The defuzzification method developed by Chen and Klein (1997) is a very sensitive and effective approach that discriminates between two fuzzy numbers during fuzzy ranking by performing numerous simulated experiments in which various linear or nonlinear fuzzy numbers and various degrees of overlap of fuzzy numbers are applied. The method utilizes fuzzy subtraction of a referential rectangle, \tilde{Z} , from a fuzzy number, \tilde{X} ; the rectangle is obtained by multiplying the height of the membership function of \tilde{X} by the distance between the two crisp maximizing and minimizing barriers. Hence, \tilde{Z} is considered a fuzzy number. Fuzzy subtraction of the referential rectangle, \tilde{Z} , from the fuzzy number, \tilde{X} , can be performed at level μ_i by the following:

$$\tilde{X}_{\mu_i} - \tilde{Z} = [l_i, r_i] - [a_1, a_2] = [l_i - a_2, r_i - a_1] \tag{4}$$

$i = 0, 1, 2, \dots, \infty$

where l_i and r_i are the left and right fuzzy numbers of \tilde{Z} , and a_1 and a_2 are the left minimum and right maximum fuzzy numbers, respectively.

Defuzzification of a fuzzy number is performed by:

$$D(\tilde{X}) = \frac{\sum_{i=0}^n (r_i - a_1)}{\left(\sum_{i=0}^n (r_i - a_1) - \sum_{i=0}^n (l_i - a_2) \right)}, \tag{5}$$

where n is the number of α -levels, and as n approaches ∞ , the summation approaches the area measurement. In

Eq. (5), $\sum_{i=0}^n (r_i - a_1)$ is positive, $\sum_{i=0}^n (l_i - a_2)$ is negative and $0 \leq D(\tilde{X}) \leq 1$. The minimum values of the left spread and the maximum values of the right spread of the fuzzy numbers are a_1 and a_2 , respectively. This proposed framework allows experts to identify options using linguistic expressions. The unique point of this study was involved in qualitative descriptions of linguistic expressions presented by TFNs and defuzzification into a crisp value for analysis by ANP.

ANP approach

ANP is a generalization of the analytical hierarchical process (AHP) (Saaty, 1996). While AHP represents a framework with a unidirectional hierarchical AHP relationship, ANP allows for complex interrelationships among decision levels and criteria. The ANP feedback approach replaces hierarchies with networks in which the relationships between levels are not easily represented as higher, lower, dominant or subordinate. Given the problems encountered in reality, a dependent and feedback relationship is usually generated among the criteria and such interdependence relations usually become more complex with the change in scope and depth of the decision-making problems.

ANP uses a supermatrix to deal with the relations of feedback and dependence among the criteria. If no interdependent relationship exists among the criteria, then the pairwise comparison value would be 0. If an interdependence and feedback relationship exists among the criteria, then such values would no longer be 0, and an unweighted supermatrix M will be obtained. If the matrix does not conform to the principle of column stochasticity, the decision maker can provide the weights to adjust the matrix into a supermatrix that conforms to the principle of column stochasticity, producing a weighted supermatrix M . The limited weighted supermatrix M^* is based on Equation (6) and allows for gradual convergence of the interdependence relations to obtain the accurate relative weights among the criteria. The following equations are applied in this study:

$$M^* = \lim_{k \rightarrow \infty} M^k \tag{6}$$

In testing for the consistency of a judgment matrix,

acceptable matrix results have consistency index (C.I) and consistency ratio (C.R.) values less than 0.1 and the C.I. of a judgment matrix can be obtained by:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (7)$$

When $\lambda_{\max} = 0$, complete consistency exists within judgment procedures. When $\lambda_{\max} = n$, the C.R. of C.I. to the mean random consistency index R.I. is expressed as C.R. The equation is as thus:

$$CR = \frac{CI}{RI} \quad (8)$$

ANP is a mathematical theory that can deal with multiple dependencies systematically. The merits of ANP in group decision-making are (Dyer and Forman, 1992; Tseng et al., 2008); (i) both tangibles and intangibles, individual values, and shared values can be included in the decision process; (ii) the discussion in a group can be focused on objectives rather than on alternatives; (iii) the discussion can be structured so that every factor relevant to the decision is considered; and (iv) in a structured analysis, the discussion continues until relevant information from each individual member in the group is considered and a consensus is achieved. However, ANP presents the interdependence relations; this study further analyzes the ANP results using QFD.

QFD approach

QFD is a method that translates customer needs into product technical requirements of new products and services that have been developed in Japan in the late 1960s to early 1970s (Chan and Wu, 2002). The main concept of traditional QFD considered four relationship matrices that included product planning, parts planning, process planning, and production planning matrices (Karsak et al., 2002; Bevilacqua et al., 2006). Each translation used a matrix, which is also called house of quality (HOQ).

To establish these interdependence relations, the business natures are translated into enablers, and controls of the enablers depend on criteria. Several of the critical notions can be expressed thus: competitive advantages. The first step is to identify the "whats". In sum, there are four enablers for defining the outsourcing performance suggested by Bevilacqua et al. (2006); motives, part characteristics, supplier operating capabilities and supplier relation strategies. GOP guides manufacturing processes toward continuous improvement and sustainable development.

However, interdependence relations exist in the nature of competitive advantages, GOP enablers, and criteria. This study assumes that interdependence relations exist.

Therefore, this study employs ANP to represent the interdependence relations between "whats" and "hows". It is noteworthy that interdependence occurs in all relations. In general, the conventional QFD approach lacks consideration of interdependence. This approach presumes interdependence relations between the "hows", "whats" and HOQ. The main outputs of this study are obtained from preceding steps of this approach.

Hierarchical structure of GOP

The proposed hierarchical structure is based on an extensive literature review about competitive advantages and synthesis of well-known frameworks for the make-or-buy decision (Venkatesan, 1992; Vining and Globberman, 1999; Canez et al., 2000; Holcomb and Hitt, 2007; Dabhilkar et al., 2009; Tseng et al., 2008; Tseng 2010).

To successfully compete in the marketplace, firms need to offer low-price products (Reed et al., 2000). Lowering cost (CA1) can capture the competitive advantage by measuring the emphasis placed on reducing production costs, reducing inventory, increasing equipment utilization, and increasing capacity utilization. Quality (CA2) is a critical competitive advantage for satisfying customer requirements, and quality of conformance is important to meet product design and operating specifications (Garvin, 1987; Fisher, 1997; Chase et al., 2001; Li et al., 2006). Moreover, delivery reliability (CA3) means that the ability to meet a delivery schedule or promises due to delivery capability is assessed by speed, dependability and production lead time; it also refers to a firm's ability to supply the product on a promised delivery due date. As mentioned earlier, flexibility (CA4) is a complex and multi-dimensional capability that requires a company-wide effort to increase a firm's responsiveness and reduce waste and delays. Flexibility is defined as the firm's ability to provide rapid design change, a wider product range, greater order size flexibility and a greater number of new products (Sethi and Sethi, 1990; Kathuria, 2000; Zhang et al., 2002; Dreyer and Gronhaug, 2004).

Four important enablers emerged from this analysis; competitive advantages, motives for outsourcing (EN1), characteristics of outsourced parts (EN2), supplier operating capabilities (EN3) and supplier relationship strategies (EN4). The literature (Canez et al., 2000; Holcomb and Hitt, 2007; Dabhilkar et al., 2009) argues that motives (E1) have little or even no influence, which usually activate triggers that lead to motives for the make-or-buy analysis. For instance, the price competition in the marketplace triggers firms to reduce costs and motivates outsourcing. Canez et al. (2000) lists a wide range of motives that can be grouped into five distinct subsets; reduce costs (C1); increase focus on industry (C2); increase quality (C3); increase responsiveness (C4); and increase innovation capability (C5).

There are three types of part characteristics in considering the make or buy analysis; volume/degree of

Table 2. Hierarchical structure of GOP.

Goal	CAs	ENs	Cs
Achieving GOP	Competitive advantages - Lowering cost (CA1); Quality (CA2); Delivery reliability (CA3); and Flexibility (CA4)	Motives (E1)	Reduce cost (C1) Focus on industry(C2) Quality (production and service quality) (C3) Responsiveness (customer requirements) (C4) Innovation capability (green or new production development) (C5)
		Part characteristics (E2)	High volume/ standardized parts(C6) Complexity in (green) manufacturing (C7) Complexity in (green) design(C8) Importance to perception of green-product(C9)
		Supplier operating capabilities (E3)	High volumes of outsourced parts(C10) Design of outsourced (green) parts(C11) Purchasing (green)materials of outsourced parts(C12) Operations in low wage countries(C13)
		Supplier relation strategies (E4)	Sharing the production plans and system(C14) Adaptation of production (innovation) processes(C15) Common work for cost reduction(C16) Supplier involvement in new product development (C17)

standardization (C6), complexity, and importance (Vining and Globberman, 1999; Holcomb and Hitt, 2007), with regard to high-volume or standardized parts can be linked to low costs (Vining and Globberman, 1999), outsourcing offers opportunities for lowering costs. Complexity in green manufacturing (C7) and design (C8) is related to technological uncertainty. At increasingly higher levels of uncertainty, this study's emphasis is to reduce cost economies and increase the difficulty of inter-firm collaboration. The customers' perception on green product attributes should be classified as strategic designs (C9). Strategic designs mostly link to taking advantage of the suppliers' higher innovation capability and is often expressed as strategic outsourcing performance (Venkatesan, 1992; Holcomb and Hitt, 2007).

The reviewed GOP indicates that the supplier's operating capabilities are an important enabler to consider in the make-or-buy analysis; the point in outsourcing is to find a partner that complements the capabilities of the firm. The outsourcing suppliers have a distinct comparative advantage such as lower cost structure or stronger performance incentives. The works of Sturgeon (2002) and Tseng (2010) are used to narrow down the capabilities actually contributing to improved performance. Capabilities of performance improvements are identified as volume (C10), design for manufacturing (C11), purchasing scale in green concept (C12) and low-wage operations (C13). Outsourced higher volume parts lead to lower fixed costs, and the supplier should be better able to cope with volume changes for individual

customers because demand is aggregated for several customers. However, the purchasing capability for outsourced parts also leads to lower variable costs to get pre-specified components for several customers at lower costs. The operations in low-wage countries lead to lower costs of goods sold that requires labor-intensive or OEM firms. Moreover, the supplier can alter green product design to incorporate cheaper and better components. Standardization of the production processes leads to additional possibilities for continuous improvements.

Sharing of production plans and systems (C14) is related to having a cost focus and is often described as operational collaboration for adaptation of production processes (C15). This collaboration reduces the common work for cost reduction (C16) and allows the firm to receive some benefits as improved pricing and delivery performance through sharing operational schedules and linking forecasting systems. In contrast, these collaboration types are related to having a more differentiated focus on trying to attain superior product functionality and are described as strategic collaborations, which are aimed at competitive advantages from new product development (C17). Thus, to carefully manage resources and capabilities, distinct competence in the marketplace needs to be created (Cousins, 2005; Tseng 2010) (Table 2).

In summary, these criteria are composed for analysis of GOP. There is also strong support from previous studies for assuming that there are dependence relations among the competitive advantages, GOP enablers, and criteria (Leiblein et al., 2002; Tseng and Lin, 2009).

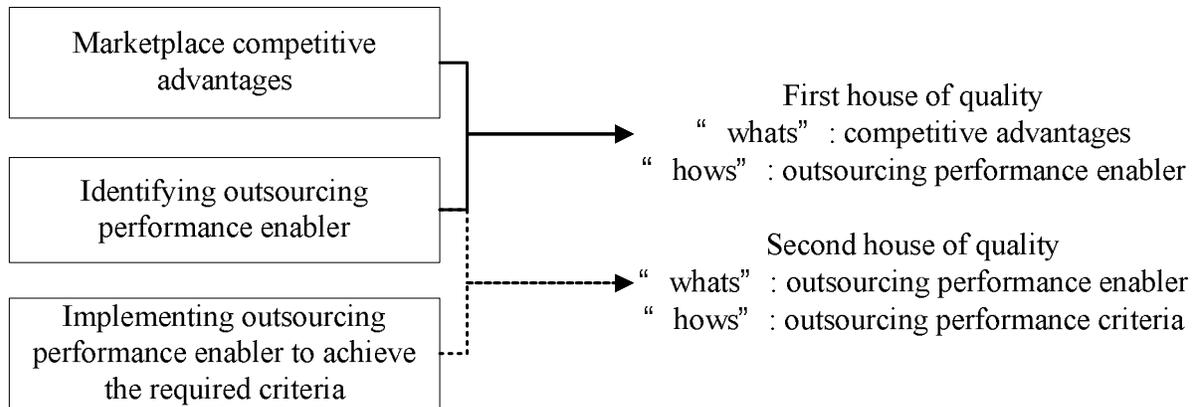


Figure 2. Approach to GOP.

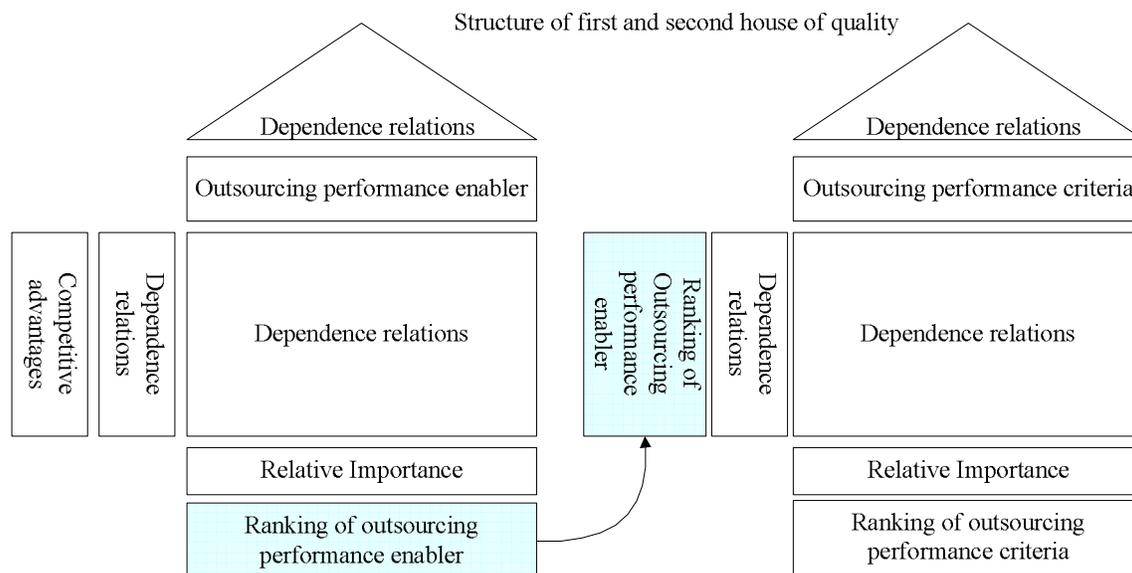


Figure 3. Structure of first and second house of quality.

Proposed approach

In this proposed approach, QFD and HOQ principles are translated from the GOP enablers and criteria. Specifically, this study proposes to exploit HOQ to relate competitive advantages to enablers and criteria. The conceptual model is shown in Figure 2. As seen from the figures, this study requires building an HOQ with the specific structure detailed in Figure 3. Details on how to build the HOQ are provided further. In achieving a favorable solution, the group decision-making process is usually important to any organization. This is because the process of arriving at a consensus should be based upon the reaction of multiple individuals, whereby an acceptable judgment may be obtained.

There are two stages proposed in this study: (1) the

competitive advantages tell the company “what to do” in achieving GOP enablers and (2) the enablers are specified as the “hows” of QFD. As a rule of QFD, the enablers indicate the firm’s “what to do” and the criteria present “how to do” in achieving GOP.

The first HOQ aims at identifying the relevant competitive advantages ($CA_j, j = 1, 2, \dots, n$) in achieving GOP that enhance a firm’s competitiveness according to a defined set of enablers ($EN_i, i = 1, 2, \dots, m$). Consequently, CAs appear as “whats” in the HOQ, because companies should first identify and rank appropriate dimensions to compete, while ENs appear as “hows”, because they express attributes to be enhanced depending on the competitive advantages firms are willing to excel in. Nonetheless, as shown earlier, suggestions to identify both ENs and Cs can be found in

the literature (Vining and Globerman, 1999; Canez et al., 2000; Holcomb and Hitt, 2007; Dabhilkar et al., 2009), and depending on the specific case study, they may either be considered as exhaustive or different.

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Otherwise, additional CAs/ENs and ENs/Cs could be defined and listed in the HOQ as “whats” and “hows”.

To achieve GOP and improve the performance of previous methods, this study proposes the following steps for the approach:

1. Gather relevant information from a literature review and expert opinions; it is necessary to consult a group of experts to confirm the reliability of the GOP measures and as mentioned previously, what is necessary to form an expert group for professional and academic knowledge to achieve the evaluation goal.
2. Developing GOP enablers and criteria and survey instrumentation what is important to establish a set of enablers and criteria for evaluation. However, the enablers and criteria have naturally complicated relations within their clusters. To deal with the problem of interdependence, ANP is suitably applied and QFD transfers the customer's voice and competitive advantages to operate in a firm. Moreover, to acquire the responding instrument to ascertain the relationships among the evaluation criteria, it is necessary to consult a group of experts that can confirm reliable information of the influences and directions of the criteria.
3. The crisp value number must be normalized to achieve criteria values that are comparable among all criteria. Interpreting linguistic information into fuzzy linguistic scales can be accomplished using linguistic information to convert fuzzy numbers into crisp values; the fuzzy assessments are defuzzified and aggregated as a crisp value by using the definitions in Equations (1) and (2), and applying Equations (3) to (5).
4. The crisp values are composed into the weight matrices. The interdependence matrices are from ANP using Equations (6) to (8). The crisp value can be composed into a pairwise comparison matrix and the matrix can be decomposed with MATLAB 6.5 to acquire the eigenvector. Moreover, the eigenvector must be normalized into local priority for composing the unweighted supermatrix. In testing for the consistency of a judgment matrix, its consistency index (C.I.) can be obtained using Equation (7). We can acquire the λ_{\max} value in the process of decomposing the pairwise comparison matrix. In addition, when $\lambda_{\max} = 0$, complete consistency exists within judgment procedures. When $\lambda_{\max} = n$, the consistency ratio (C.R.) of C.I. to the mean random consistency index R.I. is expressed as C.R. using Equation (8).
5. The final result can be obtained first from a QFD modeling competitive advantages vs. enablers, and secondly, QFD model is the result of the first QFD model vs. criteria of GOP (Figure 3). The result is obtained by multiplying the matrices to arrive at an overall ranking.

EMPIRICAL STUDY

The aim of this is to operationalize the evaluation

methodology for achieving GOP at a case firm. There are reasons for firms' GOP evaluation. First, the case firm continues to face challenges with how they manage the competitive advantage of GOP enablers. Second, the case firm has to follow the enablers to develop the criteria from a competitive market. In this study, the expert team is formed from two professors, one vice president and five management professionals with extensive consulting experience.

Problem statement

Under the prosperous and booming electronic consumption products and network market, COM Co., LTD is not only the largest professional PCB manufacturer in Taiwan, but it is also ranked as number six worldwide. To offer the best service by an electronic manufacturer, COM Co., LTD is continuing to develop new generation technology, enhancing competitiveness in green perspectives, fully satisfying the market and customer demands and developing a closer relationship with suppliers and customers. COM Co., LTD, insisting on the principle of “highest quality and customer first”, have, and continue to spend a lot of effort on improving processes developing GOP and setting the full quality system to meet customer green requirements. Due to electronic product replacement, rapid and new technologies are explored. The capability of developing and researching new technologies is a global competition resource, which meets product demands from customers and explores new products on the market. Therefore, GOP is relatively important for COM to sustain in such a competitive market.

The expert group strived to recommend competitive advantages, enablers, and criteria, and they are expected to remain a long-term competitor in an intensive market. The expert group reviewed the competitive advantages, enablers, and criteria, because GOP is one of the most prioritized issues of the management team. The expert group has a similar need of finding a suitable supplier regarding GOP. It intends to evaluate and select a proper supplier prior to GOP in a more logical and persuasive way as there is a growing need for an analytical and systematic way of solving management decision procedures. For better handling of this problem, the eight experts should adopt possible relative importance criteria. This study would provide criteria ranking, and it would be useful for efficient and effective GOP achievement.

The results

Table 3. Example of TFNs in competitive advantages.

CA 1	CA 1	CA 2	CA 3	CA4
CA 1	1.00	(0.40, 0.50, 0.60)	(0.80, 1.00, 1.00)	(0.60, 0.70, 0.80)
CA 2	(1.67, 2.00, 2.50)	1.00	(0.40 0.50 0.60)	(0.60, 0.70, 0.80)
CA 3	(1.00, 1.00, 1.25)	(1.67, 2.00, 2.50)	1.00	(0.20, 0.30, 0.40)
CA 4	(1.25, 1.43, 1.67)	(1.67, 2.00, 2.50)	(2.50, 3.33, 5.00)	1.00

Table 4. Defuzzification and eigenvector.

CA 1	CA 1	CA 2	CA 3	CA 4	E-vector	Weights
CA 1	1.00	0.13	6.92	0.17	0.48	0.24
CA 2	8.00	1.00	0.35	0.94	0.55	0.28
CA 3	0.14	2.83	1.00	5.99	0.53	0.27
CA 4	5.92	1.07	0.17	1.00	0.44	0.22

Table 5. Unweighted super matrix of competitive advantages.

Weights	CA 1	CA 2	CA 3	CA 4
CA 1	0.24	0.31	0.37	0.27
CA 2	0.28	0.21	0.15	0.23
CA 3	0.27	0.29	0.29	0.22
CA 4	0.22	0.19	0.19	0.28

1. The evaluation goal is to identify significant decision-making criteria and form an expert group with professional and academic knowledge to evaluate the competitive advantages, enablers and criteria of GOP.

2. The evaluation pairwise comparison questionnaire is with a set of competitive advantages, enablers and criteria for experts' evaluation. The professional experts have over ten years of experience in the case firm. However, the group of experts is necessary to confirm that the competitive advantages, enablers and criteria, are reliable. This study follows the nature of all measures with interdependence relations; ANP is proposed to deal with this particular issue. These experts were requested to complete a survey using subjective judgment for the importance of each criterion for the hierarchical structure of the study's framework.

3. However, the qualitative measures are always subjective with linguistic preferences. Therefore, the measures have to be based on the TFNs to transform the linguistic preferences into comparable crisp scores; examples of TFNs are presented in Table 3. Interpreting the linguistic information into a fuzzy linguistic scale (Table 2) is by conversion of fuzzy numbers into crisp values by applying Equations (3) to (5) to defuzzify and aggregate the crisp values. A crisp value must be normalized to achieve criteria values that are comparable

among all criteria. The weights of competitive advantages are 0.24, 0.28, 0.27, and 0.22 (Table 4).

4. The interdependence matrices are from ANP using Equations (6) to (8). The crisp values can compose a pairwise comparison matrix, and decomposition of the matrix can be performed by MATLAB 6.5 to acquire the eigenvector. The eigenvector must be normalized into weights for composing the unweighted supermatrix. In testing for the consistency of the judgment matrix, C.I. is 0.075. If the C.I. ratio is greater than 10%, we need to revise the subjective judgment. The C.R. resulted in 0.085, which is also lower than 0.1. The unweighted supermatrix of competitive advantages is presented. The weights of each competitive advantage are the following; competitive advantage's weights in CA 2 are 0.31, 0.21, 0.29 and 0.19; and the weights in CA 3 are 0.37, 0.15, 0.29 and 0.19; and the weights in CA 4 are 0.27, 0.23, 0.22 and 0.28, as shown in Table 5. Lastly, the ranking of the converged competitive advantage matrix from Table 5 is CA1 (0.296) > CA3 (0.267) > CA4 (0.219) > CA2 (0.218).

Repeating step 4, the weights of each enabler are the following; the enabler's weights in EN1 are 0.40, 0.50, 0.04 and 0.06; the weights in EN2 are 0.23, 0.21, 0.29 and 0.27; the weights in EN3 are 0.32, 0.21, 0.28 and 0.19; and the weights in EN4 are 0.37, 0.23, 0.12 and 0.28. The ranking of the converged enablers matrix is

EN1 (0.327) > EN2 (0.309) > EN (0.189) > EN3 (0.175).

Table 6 presents the unweighted supermatrix for each criterion. Defuzzification is computed seventeen times to acquire the E-vector and normalize by the weights. For

Table 6. Unweighted super matrix of criteria.

Weights	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17
C1	0.0006	0.085	0.075	0.074	0.065	0.057	0.068	0.057	0.062	0.095	0.360	0.068	0.052	0.075	0.085	0.098	0.055
C2	0.0005	0.062	0.045	0.063	0.052	0.052	0.056	0.052	0.053	0.052	0.044	0.038	0.052	0.080	0.070	0.052	0.052
C3	0.0007	0.039	0.062	0.039	0.085	0.063	0.085	0.039	0.039	0.062	0.039	0.039	0.049	0.062	0.062	0.062	0.062
C4	0.0016	0.052	0.041	0.040	0.060	0.086	0.038	0.085	0.040	0.041	0.039	0.040	0.085	0.041	0.041	0.041	0.090
C5	0.0018	0.023	0.044	0.085	0.085	0.056	0.090	0.076	0.038	0.044	0.038	0.012	0.041	0.044	0.044	0.044	0.044
C6	0.0024	0.034	0.042	0.078	0.041	0.058	0.042	0.065	0.039	0.042	0.041	0.150	0.068	0.042	0.042	0.042	0.042
C7	0.0050	0.039	0.070	0.050	0.075	0.041	0.041	0.058	0.042	0.039	0.041	0.042	0.068	0.039	0.039	0.039	0.039
C8	0.0054	0.050	0.044	0.039	0.069	0.080	0.043	0.061	0.042	0.044	0.039	0.078	0.060	0.044	0.044	0.044	0.044
C9	0.0083	0.096	0.096	0.040	0.040	0.041	0.086	0.056	0.041	0.096	0.041	0.044	0.085	0.096	0.096	0.096	0.096
C10	0.0146	0.060	0.060	0.041	0.040	0.040	0.039	0.075	0.065	0.060	0.040	0.063	0.040	0.060	0.060	0.060	0.060
C11	0.0267	0.052	0.052	0.037	0.037	0.091	0.056	0.052	0.037	0.052	0.037	0.085	0.062	0.052	0.052	0.052	0.052
C12	0.0331	0.056	0.056	0.041	0.085	0.040	0.041	0.086	0.041	0.056	0.041	0.061	0.085	0.056	0.056	0.056	0.056
C13	0.0365	0.062	0.062	0.085	0.072	0.041	0.081	0.086	0.098	0.062	0.040	0.085	0.039	0.062	0.062	0.062	0.062
C14	0.0833	0.035	0.020	0.075	0.057	0.039	0.040	0.041	0.150	0.020	0.040	0.080	0.041	0.020	0.020	0.020	0.020
C15	0.2300	0.085	0.095	0.063	0.053	0.035	0.075	0.035	0.085	0.095	0.034	0.035	0.035	0.095	0.095	0.095	0.095
C16	0.1692	0.084	0.084	0.095	0.040	0.100	0.062	0.040	0.068	0.084	0.040	0.039	0.055	0.084	0.084	0.084	0.084
C17	0.3803	0.090	0.052	0.058	0.041	0.085	0.059	0.040	0.060	0.052	0.040	0.040	0.085	0.052	0.052	0.052	0.052

example, the weights from C1 to C17 in C1 are 0.0006, 0.0005, 0.0007, 0.0016, 0.0018, 0.0024, 0.0050, 0.0054, 0.0083, 0.0146, 0.0267, 0.0331, 0.0365, 0.0833, 0.2300, 0.1692, and 0.3803.

5. The final result can be obtained from the first QFD modeling competitive advantages vs. enablers. Table 7 presents the HOQ in CAs and ENs. The second QFD model is the result of the first QFD model vs. the criteria of GOP. The result is obtained from the multiplied matrix to arrive at the overall ranking. Table 8 presents the converged supermatrix HOQ of ENs and Cs. The several ANP interdependence matrix results are used to compose the unweighted supermatrix. The supermatrix is a partitioned matrix, where each sub matrix is composed of a set of relations of feedback or dependency.

Table 9 shows the relative importance and final ranking. The ranking of criteria is as follows: C16(0.0637) > C15(0.0629) > C2(0.0616) > C7(0.0611) > C17(0.0606) > C11(0.0602) > C12(0.0598) > C4(0.0597) > C9(0.0595) > C14(0.0592) > C10(0.0602) > C1(0.0564) > C5(0.0552) > C8(0.0552) > C3(0.0550) > C13(0.0535). To assess the evaluation in an effective way, several managerial implications can be derived from the results.

MANAGERIAL IMPLICATIONS

To assess the evaluation in an effective way, the valuable cues can be drawn from the relative importance (Table 9) and the final ranking. The

GOP framework is used to evaluate the impact at various activities and thus provides a mechanism to monitor and establish a measurement platform for the firms. Although in previous studies there was a great deal of variation in this measurement, this variation did not generally appear to have a clear link to these organizational decision contexts. Indeed, in regards to the prior study that only stressed a single variable and the rapidly changing challenge for the business environment, a single model or variable was not good enough for evaluation. Because GOP is multi-hierarchical in nature, measures of concepts and single models cannot be good enough for evaluation. In particular, when evaluating the impact of introducing developed GOP, activities need to form the overall competitive advantages and

Table 7. HOQ of competitive advantages and enablers.

	EN 1	EN 2	EN 3	EN 4
CA 1	0.268	0.157	0.196	0.356
CA 2	0.315	0.516	0.210	0.256
CA 3	0.296	0.125	0.186	0.178
CA 4	0.121	0.202	0.408	0.210

Table 8. Converged HOQ of enablers and criteria.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17
EN 1	0.24	0.27	0.24	0.26	0.24	0.26	0.26	0.24	0.26	0.25	0.26	0.26	0.23	0.26	0.27	0.28	0.26
EN 2	0.24	0.27	0.24	0.26	0.24	0.26	0.26	0.24	0.26	0.25	0.26	0.26	0.23	0.26	0.27	0.28	0.26
EN 3	0.24	0.27	0.24	0.26	0.24	0.26	0.26	0.24	0.26	0.25	0.26	0.26	0.23	0.26	0.27	0.28	0.26
EN 4	0.24	0.27	0.24	0.26	0.24	0.26	0.26	0.24	0.26	0.25	0.26	0.26	0.23	0.26	0.27	0.28	0.26

consider its effect on the organization contextual. The proposed framework can provide managers and researchers better understanding of the differences in management activity needs and specific management interventions that would improve the likelihood of excellent and useful research by examining the seventeen criteria of this approach. These criteria serve as bridging mechanisms that help with GOP for a firm. The proposed framework also provides the function of management control and track, further helping to describe the dilemmas. For example, the converged weights of four competitive advantages are described. Here, the values of lowering cost, quality, delivery reliability, and flexibility are 0.296, 0.218, 0.267, and 0.219, respectively. The converged weights of the enabler for motive, parts characteristics, supplier operating capabilities, and supplier relation strategies are 0.327, 0.309, 0.175, and 0.189, respectively. Table 9 represents the overall relative importance value of the evaluators' perception of the criteria perspective. The top 10 ranking criteria are; 1) common work for cost reduction (C16); 2) adaptation of production (innovation) processes (C15); 3) quality (production and service quality) (C3); 4) complexity in (green) manufacturing (C7); 5) supplier involvement in new product development (C17); 6) design of outsourced (green) parts (C11); 7) purchasing (green) materials for outsourced parts (C12); 8) responsiveness (customer requirements) (C4); 9) importance to perception of green-product (C9); and 10) sharing the production plans and system (C14). Furthermore, in lowering cost, management must be tracked back for improvement of the motive enablers in the criteria of common work for cost reduction. In other words, the motive is most important when aligned with a specific competitive advantage. Similarly, the common work for cost reduction is also tracked back and upon inspecting their production process, the decision department is asked to improve them. Therefore, the

adaptation of production (innovation) processes shows the second weighted criteria. Throughout analyzing all sets of measures by experts, lowered cost is determined by the OEM firm's management, which is meaningful to their cost structure. In the broader sense, the proposed framework can be used as an analytical monitoring tool to develop and construct the overall strategic GOP of the case firm. For the practice of management, the framework is sufficient for organizational managers to greatly understand GOP as an interrelated combination of the enablers and criteria in alignment with competitive advantages. Through the framework, the managers are able to capture a fairly complete picture of GOP contextually. In other words, managers may find that application of the framework for assessing the relative performance of the criteria of the proposed framework developed, validated and operationalized in their daily operations and management activities is a useful decision-making framework for reviewing and improving GOP evaluation and strategic development, which may lead to enhancing performance and sustaining a competitive advantage.

In addition, this study has several implications for firms that intend to evaluate OEM firms in terms of GOP. The main contribution of the paper is the hierarchical and feedback model using the ANP approach. This model provides a useful guideline as a structured and logical means of synthesizing judgments for evaluating appropriate GOP criteria for an OEM firm. It helps structure a difficult and often emotion-burdened decision. The second implication is the enablers listed in the proposed model. Based on a comprehensive review, the features of enablers have been examined and identified. These give an overview structure for the case firms without much knowledge of GOP. Such firms can better understand the evaluation criteria in terms of the competitive advantages and enablers in achieving GOP. The ANP methodology is particularly useful for decision

Table 9. Result

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17
R.I.	0.0819	0.0895	0.0798	0.0868	0.0802	0.0860	0.0887	0.0801	0.0864	0.0832	0.0875	0.0869	0.0777	0.0860	0.0914	0.0926	0.0881
Weights	0.0564	0.0616	0.0550	0.0597	0.0552	0.0592	0.0611	0.0552	0.0595	0.0573	0.0602	0.0598	0.0535	0.0592	0.0629	0.0637	0.0606
Ranking	12	3	14	8	13	10	4	13	9	11	6	7	15	10	2	1	5

making in a multi-criteria, interdependence context.

Moreover, the proposed framework may also have an advantage in customizability as other OEM firm's management can take the framework and modify it for use in their own GOP activities. In this manner, evaluators need to take the GOP and delete their relevant criteria from it and add what is missing. Consequently, GOP can be used with different enablers/criteria or aligned with a specific competitive advantage and can be further modified and refined if required.

Concluding remarks

The studies competitive advantages, enablers and criteria, serve as bridging mechanisms that are helpful in achieving GOP. The literature has contributed to identifying the measures influencing the evaluation of a specific case firm. The main contributions of this study are twofold. First, evaluation can be considered as a complex, interdependent and uncertain decision-making problem. This study conducts a review of the literature to generate seventeen criteria along with four enablers to measure the GOP.

Second, this study integrates TFNs, ANP and QFD to develop a FNQFD evaluation model that prioritized the relative weights of measures. The proposed method can be used not only as a way to handle the interdependence within a set of measures but also as a way of producing more

valuable information to acquire the measures' ranking for decision-making of GOP evaluation. The study findings indicated that there are solid results with regard to the proposed evaluation. Analysis of these results provides guidance to a firm's management in identifying the key criteria facilitating GOP evaluation and finds the best direction for improving a firm's GOP currently.

From a firm's management perspective, the findings provide suggestions to the case firm. First, because common work for cost reduction generally considers most weight on the case firm, enhanced daily operations can help reduce and figure out their cost structure by enhancing the adaptation of production (innovation) processes and reducing common works in operation. In terms of GOP, the management should actively focus on industry to satisfy the customer needs, and the complexity in (green) manufacturing should promptly and accurately present satisfying contents and subjects, while also being sufficient to help management enhance their internal operations. Second, to cater the supplier involvement in new product development, the internal process design should provide an effective process with shorter waiting time in internal operation aspects. Management should improve the internal information system to provide effective new product information in supplier points of view.

There are several limitations to this study, requiring further examination and additional research. First, this study was conducted with

relatively expert group samples. A larger sample that brings more explanatory power would have allowed for a more sophisticated evaluation analysis. The study findings should be verified with a larger sample to increase generalizability. Second, this study uses FNQFD to develop an evaluation model that helps management understand the critical criteria in implementing GOP evaluation. Future studies can adopt additional fuzzy multi-criteria approaches (such as TOPSIS, VIKOR and DEMATEL) to estimate the relative weights of the influences on proposed evaluation. The results of future studies can then be compared with the results presented here. Third, the evaluation criteria were selected from a review of the literature on this approach, an intensive review that excluded some possible influences in achieving GOP evaluation.

Future studies can use different methodologies, such as longitudinal studies and interviews to identify other criteria. Finally, to provide more objective information on applicability of the proposed FNQFD evaluation model, future studies need to be undertaken using case studies of particular GOP evaluation, thus proving the practicality of the FNQFD evaluation procedure proposed by this study. In addition, this study provides a valuable reference for OEM firms concerned with GOP. Results of this study significantly contribute to the efforts in evaluating whether the firm complies with potential customer/supplier requirements based on their capabilities.

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Full Length Research Paper

An structural equation modeling (SEM) evaluation of the statistical adequacy of the strategic management model

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This paper attempts to confirm the adequacy of the strategic management model using the structural equation modeling (SEM) method. The model adopted the resource-based view (RBV) approach to identify competitive strength. The RBV method states that organizations with the right resources coupled with the appropriate management skills and capabilities will develop competitive strength and organizational performance. Results generated by AMOS graphics v. 18, an SEM statistical software, confirm the adequacy of the model for companies engaged in the industrial products sector. Financial strength was found to be a better predictor of competitive advantage than management strength. The results also confirm that competitive advantage has a positive impact on the profitability and performance of organizations.

Key words: Strategic management, competitive advantage, resource-based view (RBV), structural equation modeling (SEM).

INTRODUCTION

Porter (1985) introduced the concept of value chain of organizations and argues that understanding value chain analyses (VCA) of organizations and strengthening the activities of the chain could bring about sustainable competitive advantage and improve companies' performance. David (2011) refers value chain analysis (VCA) to "the process whereby a firm determines the costs associated with organizational activities from purchasing raw materials to manufacturing products to marketing those products." However, he cautions that substantial subjective judgment may be required in performing VCA as there may be complex interrelationships between the activities of the value chain. These complexities make costing the value chain activities very difficult and challenging.

Pearce II and Robinson (2011) proposed another method to explore and identify competitive strength by

evaluating the capabilities and assets, and the related performances of organizations. This method is called the resource-based view (RBV) of the firm. They explain that the underlying assumption of RBV is that "firms differ in fundamental ways because each firm possesses a unique 'bundle' of resources – tangible and intangible assets and organizational capabilities to make use of those assets. Each firm develops competencies from these resources, and when developed especially well, these become the source of the firm's competitive advantages" (Pearce II and Robinson, 2011). It follows that competitive strength of organizations could be brought about by identifying of their resources and with the skills and capabilities of the management, develop these resources into a distinctive competence. Organizations with distinctive competencies are likely to have sustainable competitive strengths and outstanding performance in the market-place.

This paper attempts to confirm the validity of the RBV method; that organizations with the right resources coupled with the appropriate management skills and capabilities have competitive strengths and good

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organizational performance.

RESEARCH FRAMEWORK

David (2011) purports the “the resource-based view (RBV) approach to competitive advantage contends that internal resources are more important for a firm than external factors in achieving and sustaining competitive advantage.” Proponents of the RBV view contend that organizational performance will primarily be determined by internal resources (Grant, 1991).

According to the RBV method, there are three basic types of resources, and some of these may become the building blocks for distinctive competences: tangible assets, intangible assets, and organizational capabilities (Pearce II and Robinson, 2011). These resources are defined further.

Tangible assets are the easiest resources to identify and are often found on a firm’s balance sheet. They include production facilities, raw materials, financial resources, real estate, and computers. Intangible assets are resources such as brand names, company reputation, organizational morale, technical knowledge, patents and trademarks, and accumulated experience within an organization. Organizational capabilities are not specific inputs like tangible or intangible assets; rather, they are skills – the ability and ways of combining assets, people, and processes – that a company uses to transform inputs into outputs (Pearce II and Robinson, 2011).

David (2011) contends that internal resources can be grouped into three categories: physical resources, human resources, and organizational resources. David (2011) further explains them thus: physical resources include all plant and equipment, location, technology, raw materials, machines. Human resources include all employees, training, experience, intelligence, knowledge, skills and abilities. Organizational resources include firm structure, planning processes, information systems, patents, trademarks, copyrights, and databases.

Dess et al. (2010) cautions that, “a firm’s strength and capabilities – no matter how unique or impressive – do not necessarily lead to competitive advantages in the marketplace.” In addition, they contend that “the ability of a firm’s resources to confer competitive advantage cannot be determined without taking into consideration the broader competitive context. A firm’s resources must be evaluated in terms of how valuable, rare, and hard they are for competitors to duplicate”.

Nevertheless, most authors agree that the RBV method is a useful and integrated tool for internal analysis and help to pin-point those resources that can generate core competencies (David, 2011; Dess et al., 2010; Pearce II and Robinson, 2011). David (2011) continues to comment that “the RBV has continued to grow in popularity and continues to seek a better understanding of the relationship between resources and sustained competitive advantage in strategic management.”

David (2011) suggests that internal resources are more important than external resources to sustainable competitive strength and organizational performance. Thomson et al. (2010) argues that financial strength is the most important internal resource that leads to sustainable profitability and outstanding performance of the firm. One of the most important indicators that the company’s strategy is working or the company is performing well is the company’s overall financial strength and credit ratings are improving (Thompson et al., 2010). The other important resource strength is the competencies or skills that the management employs to transform tangible and intangible resources over time to achieve the desired performance of the organizations (Pearce II and Robinson, 2011).

Thompson et al. (2010) suggested a four-step procedure to perform a competitive strength assessment of an organization. Step 1 is to make a list of the industry’s key success factors (KSFs). Step 2 is to rate the firm on each factor. Step 3 involves summing up the strength ratings on each factor to get an overall measure of competitive strength. Step 4 is to use the overall strength ratings to draw conclusions about the size and extent of the company’s net competitive advantage. Based on the rationale of the above-mentioned procedure and literature presented earlier, it is logical argument that financial strength coupled with the appropriate management strength of the firm can bring about the overall measure of competitive strength of the firm. This measure of competitive strength is a measure of competitive advantage that further helps to achieve the financial and strategic objectives of the firm. The reasoning can be translated into a graphical model as shown in Figure 1.

We have discussed, argued, and presented the theoretical model of our study. The primary purpose of our study is to confirm the validity of the theoretical model. We will now describe and discuss the research methodology adopted to achieve the objective of the study.

RESEARCH METHODOLOGY

To test the theoretical model, data are needed. As information for financial strength and management strength is required, we sourced for secondary data and reports on the performance of public-listed companies. A guidebook, Stock Performance Guide, March 2010 Edition, published by Dynaquest Sdn. Bhd. Provided the required information and data. The guidebook provides information on over 1,000 public-listed companies covering all business industry and sectors including consumer products, industrial products, construction, trading/services, technology, hotels, properties, plantations, etc. Many strategic management authors contend that the nature of the resources and the relative importance of those resources vary by industry. Due to this reason, we only used data from companies involved in industrial products for our study. There are 104 such companies listed in the Stock Performance Guide.

According to the Stock Performance Guide (2010), four pieces of information were provided on the financial strength of the companies – Net Tangible asset backing per share (NTA), liquid asset per share (LIQ), debt to equity ratio (DERatio), and the Altman’s Z-score. The Altman’s Z-score is a popular “all-in-one”

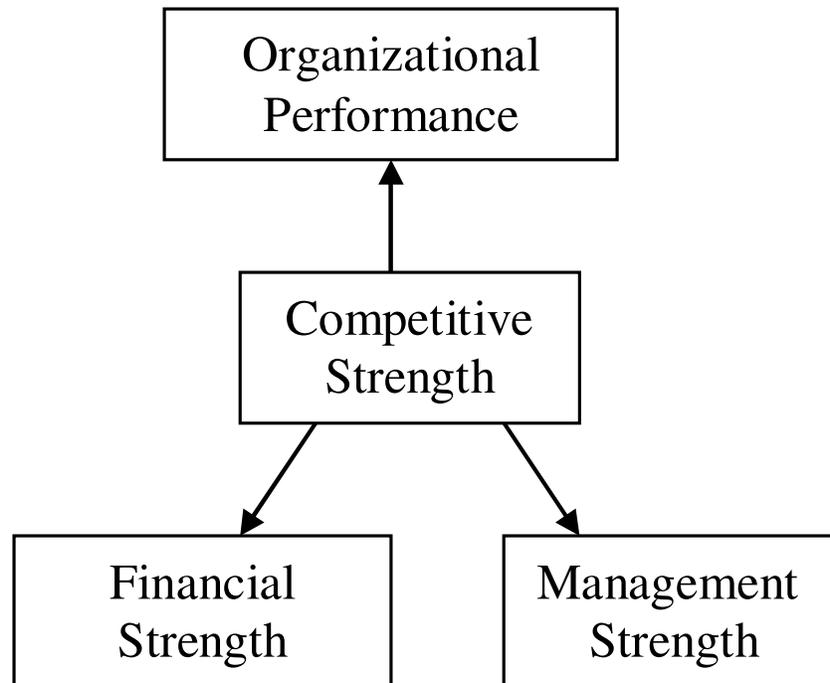


Figure 1. The theoretical model.

measure of financial strength of a company. The higher the value of the Z-score, the stronger is the company financially. Another four pieces of data on management strength of the companies are also provided – asset turnover (Asset T/O), gross margin, free cashflow to capital, and return on shareholders equity (ROE). We inspected the data provided and found that there is too many missing information on free cashflow to capital. We decided not to use the data and substitute the factor with sales margin, calculated by dividing Sales with earnings before tax, depreciation, and amortization (EBITDA).

The data were keyed-in into a statistical software, statistical packages for social sciences (SPSS) version 17. We intended to use structural equation modeling (SEM) technique to test the validity of the theoretical model. The SEM software used was AMOS Graphics version 18. Byrne (2010) defines SEM: as a statistical methodology that takes a confirmatory approach to the analysis of a structural theory bearing on some phenomenon. The term structural equation modeling conveys two important aspects of the procedure: (a) that the causal processes under study are represented by a series of structural (that is regression) equations, and (b) that these structural relations can be modeled pictorially to enable a clearer conceptualization of the theory under study. The hypothesized model can then be tested statistically in a simultaneous analysis of the entire system of variables to determine the extent to which it is consistent with the data. If goodness-of-fit is adequate, the model argues for the plausibility of postulated relations among variables; if it is inadequate, the tenability of such relations is rejected.

Within the context of SEM methodology, the measured scores or observed variables serve as indicators of the underlying construct or latent variable. As SEM takes the confirmatory approach, the researcher should have some knowledge of the underlying latent variable structure. Based on knowledge of the theory, empirical research, or both, he/she postulates relations, between the observed measures and the underlying factors a priori and then tests this hypothesized structure statistically.

Jockog (1993) distinguished among three scenarios which he

termed strictly confirmatory (SC), alternative models (AM), and model generating (MG). Byrne (2010) contends that the MG situation is the most common of the three scenarios. With the MG scenario, the researcher, having postulated and rejected a theoretically derived model on the basis of its poor fit to the sample data, proceeds in an exploratory manner to modify and re-estimate the model. The primary focus is to locate the source of misfit in the model and to determine a model that better describes the sample data. Our study used both the first-order and the second-order confirmatory factor analysis (CFA) models. We constructed the measurement models (MMs) and the structural model (SM) to develop the general SEM model. The first-order MMs were for financial strength with four observed variables: NTA, LIQ, DERatio, and the Altman's Z-score, and for management strength with three observed variables: Asset T/O, gross margin, and sales margin. The second-order MM was for competitive strength. The SM was between competitive strength, a latent variable and earnings per share (EPS), an observed variable, determining profitability and performance of the company. Following the model generating (MG) procedure, through exploratory manner to modify and re-estimate the models, we managed to determine a model that best describes the sample data. The SEM model created by AMOS Graphics version 18 is presented in Figure 2, complete with path coefficients, estimates and squared multiple correlations (SMCs).

RESULTS

We will discuss the results according to Goodness-of-fit test (normed chi-squared), Parsimony-adjusted index (RMSEA), Confirmatory fit Index (CFI) Parameter estimates, and Proportion of variance explained (SMC=R²), respectively.

The goodness-of-fit test (normed chi-squared) is the χ^2 statistics divided by the degree of freedom. The normed

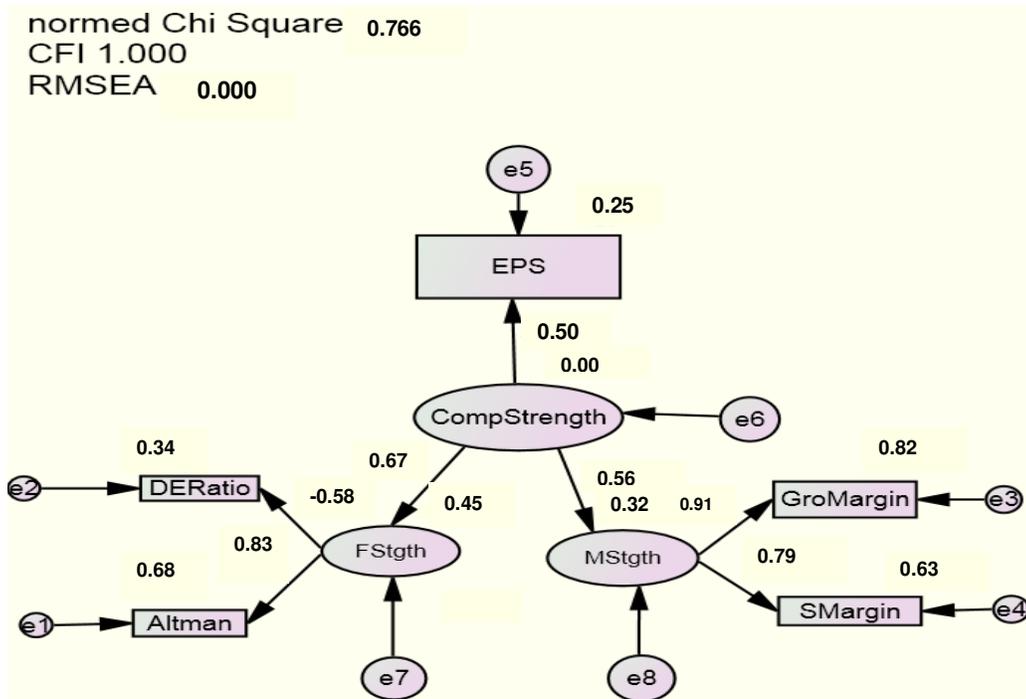


Figure 2. The strategic management theoretical model (created by AMOS Graphics v. 18).

chi-squared result for our model is 0.766. As the result is less than 5.00, the model fits the data. The p-value is 0.513 which is more than 0.05, and indicates non-significance and a fail to reject decision. A “reject of null hypothesis” decision indicates that the hypothesized model lack fit, and that the model is somewhat inconsistent with the data. In our case, the results indicate that the model fits the data.

The parsimony-adjusted index (RMSEA) includes correction for model complexity, approximates the discrepancy that could be expected in the population, and estimates the lack of fit of the hypothesized model to the population covariance matrix. While a RMSEA value of zero indicates the best-fit approximation of the population covariance matrix, a value of less than 0.08 indicates good fit. Our model shows a RMSEA value of 0.00 indicating again the hypothesized model fits the data.

The comparative fit index (CFI) indicates the improvement in fit of the hypothesized model over the base-line model. The cut-score for CFI is greater than or equal to 0.90. A value of less than 0.90 shows inadequacy of the model. In our model, the CFI score is 1.00 indicating a good fit between our model and the sample data.

In order to evaluate the reasonableness of the parameter estimates or path coefficients, we reviewed whether the estimates are statistically significant, whether the factors are practically important to the latent variables, and whether the direction (+ or -) is logical. In order for the estimates to be significant, the critical ratio (CR) results should be more than 1.96. In order for the indicators or factors to be practically important, the value

of the estimates should be more than or equal to 0.20. Whether the direction of the estimates is logical or not depends on the hypothesized theory of the model. In our case, the CR for the estimates ranges from 2.185 to 3.719, all above 1.96 indicating significance. There is also no offending estimates as all estimates are more than 0.20: DERatio (-0.58), Altman's Z-score (0.83), gross margin (0.91), sales margin (0.79) in the first-order CFA, and financial strength (0.67), and management strength (0.56). Therefore, all indicators or factors are practically important to the latent variables. Except for DERatio which has a negative estimate (-0.58), the rest of the estimates have positive values and logical direction. As far as DERatio is concerned, the negative direction is logical in theory as an increase in the DERatio estimate indicates decreasing financial strength.

Finally, for the proportion of variance explained (represented by $SMC = R^2$), the results should be more than 0.30 for good factors. In our model, the SMC results are DERatio (0.34), Altman's Z-score (0.68), gross margin (0.82), and sales margin (0.63). All the SMC values are more than 0.30 indicating that all the indicators or factors of the latent variables are good factors.

DISCUSSION

The results of the three indices, namely the normed chi-square, RMSEA, and CFI, indicate the hypothesized model fit the sample data and prove the adequacy of the model. They show that the theoretical under-pinning of

the model shown in Figure 2 is sound. The two valid indicators or factors of the first-order latent variable, financial strength are DERatio and Altman's Z-score. The other two factors, namely NTA and LIQ are excluded from the model. For the other first-order latent variable, management strength, the two valid factors are gross margin and sales margin. The other factor, namely asset T/O is excluded from the model. As for the second-order latent variable, competitive strength, the two valid factors are financial strength and management strength. This theory found support in most strategic management literature such as David (2011), Pearce II and Robinson (2010), Thompson et al. (2010), etc.

Many strategic management authors agree that the RBV method helps to pin-point the resources that can generate core competencies (David, 2011; Dess et al., 2010; Pearce II and Robinson, 2011). In our model, the factors or resources that can generate financial strength are DERatio and Altman's Z-score, and the resources that can be used to generate management strength are gross margin and sales margin. In the second-order CFA, financial strength and management strength can be used to generate competitive strength and sustainable competitive advantage. Thus, to generate financial strength, the firm should focus on building good scores in DERatio and Altman's Z-score. Similarly, to determine management strength, the firm should look specifically for high gross margin and sales margin scores.

Byrne (2010) states that the SEM approach can simultaneously analyzed the entire system of variables. Thus, AMOS graphics simultaneously analyzed the two first-order measurement models (MMs) related to financial strength and management strength and another second-order measurement model related to competitive strength. The resultant path coefficients are actually regression weights or Beta coefficients. Looking at the financial strength MM, the Beta coefficients for DERatio and Altman's Z-score are -0.58 and 0.83 respectively. SMC for DERatio and Altman's Z-score are 0.34 and 0.68 respectively. DERatio can explain 34% of financial strength and Altman's Z-score can explain 68%, and Altman's Z-score is more important to financial strength than DERatio. This means Altman's Z-score is a better predictor of financial strength than DERatio. Turning to the management strength MM, the Beta coefficients for gross margin and sales margin are 0.91 and 0.79 respectively. SMC for gross margin and sales margin are 0.82 and 0.63 respectively. This means gross margin can explain 82% of management strength and sales margin can explain 63% of management strength. Gross margin is more important to management strength than sales margin. Therefore, gross margin is a better predictor of management strength than sales margin. We now turn to the second-order MM related to competitive strength. The Beta coefficients for financial strength and management strength are 0.67 and 0.56 respectively. SMC for financial strength is 0.45 and for management strength is 0.32.

This means financial strength can explain 45% of the variances of competitive strength and management strength can explain 32% of competitive strength. Financial strength is more important to competitive strength than management strength. Therefore, financial strength is a better predictor of competitive strength than management strength. This finding found support in Thompson and Strickland (2010) who argue that financial strength is the most important resource that leads to profitability and outstanding performance of the firm.

Based on the results generated by AMOS graphics, competitive strength has positive influence on earnings per share (EPS), a measure of profitability and performance of the organizations. R is 0.50 and R² is 0.25. As competitive strength is the only variable, R is also the Pearson's correlation coefficient (r). Competitive strength has a moderate positive impact on the profitability and performance of the organizations. This finding forms the basis of strategic management theories; that in order for companies to have sustainable profitability, they must have competitive advantage in the marketplace. Synthesizing this finding with another finding, that is financial strength is a better predictor of competitive advantage, we suggest that companies with outstanding performance and profitability normally has good financial strength.

Conclusion

This study attempts to evaluate the adequacy of the strategic management model using the structural equation modeling (SEM) approach. Based on the results generated by AMOS Graphics v. 18, the strategic management model shown in Figure 2 is adequate and the model fits the sample data.

As we have only used data from companies involved in the industrial products sector, we intend to further evaluate the model with data from companies engaged in consumer products as well as those from the trading and services sectors. We will take the metric invariant approach to determine the strategic management model is business sector-invariant. In other words, we intend to determine whether business sectors have a moderating effect on the model.

In the interim, based on the results obtained, we conclude that the strategic management model is statistically adequate for companies engaged in the industrial products sector. We also confirm that financial strength is a better predictor of competitive strength than management strength, and that competitive advantage is a good platform to build sustainable profits and outstanding performance of organizations.

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Full Length Research Paper

Evaluating administrative service quality of elementary schools: A case study of remote rural area in Taiwan

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The main purpose of this paper is to use the importance-performance analysis (IPA) approach to empirically evaluate the administrative service quality (ASQ) of elementary schools based upon the teachers' perspective at remote rural area in Taiwan. At first, the fifty preliminary ASQs of elementary schools are summarized to design a questionnaire. Then, the IPA approach in conjunction with this questionnaire survey is performed to assist with the main issue. Study results show that eleven ASQs are classified as 'concentrate here' in quadrant 2; whereas the top five ASQs are highly suggested to be improved, including 'there are not plentiful and clean toilets,' 'there are not plentiful books in a library,' 'there are not complete sport and play facilities,' 'there is no convenient and sanitation facilities of drinking water,' and 'the lunch is not delicious and nutritious,' respectively. Furthermore, the results show that the elementary schools should listen attentively to the voice of customer to focus on improving these ASQs of customer requirements. It is suggested that more attentions should be paid to exploit these customer requirements effectively and then develop the profiles of solutions, which should continuously strengthen the perspective of teachers.

Key words: Importance-performance analysis (IPA) approach, administrative service quality, elementary schools.

INTRODUCTION

The role played by schools in Taiwan during early times was mainly 'education program provider.' However, the general conception towards social and education become more open-minded along with the fast changing environment, the standard of service quality delivered by service industry increased accordingly; instead of being satisfied with teaching services provided by school, students' parents actually demand school to deliver diverse education related services. Moreover, the low birth rate has become widely accepted, academic program expected by parent tends to be elite-oriented development, the demand for a comprehensive service quality provided by school therefore is even higher at present. In terms of overall service quality improvement and service efficiency, apart from appropriate hardware and software supposed to be supplied by school, how to combine school administrative functions (for example, academic, student affairs, general affairs and counseling), is in fact an important issue in educational domain (Chen and Yang, 2003; Cheng, 2007; Ting, 2009).

Ting (2009) and Cheng (2007) believe that in order to examine service quality of school, it is necessary to consider school education as one of the service industries. Service providers and customers are two major characters in school service industry. Other roles include the principal, teachers, administration employee and relevant technicians. The principle and administrative directors are classified as high/middle administrators. Teachers are the main providers of educational activity as well as the receivers of school administrative service. Administrative employee and relevant technicians are assistants in school service performance. As to students, students' parents, social people and enterprise sponsors are regarded as external customers, among them, students and their parents are considered as receivers and important influencers of education program and administration service. Social people and enterprise sponsors are categorized as school supervisors.

A research finding established by numerous documentations (Andreassen, 2001; Boulding et al., 2005; Chou et

al., 2009; Disney, 1999; Karande et al., 2007; Kotler, 2000; Lin, 2010; Lovelock and Wirtz, 2011; Lu and Wu, 2010; Lu et al., 2009; Wu et al., 2008) focusing on various industries studies indicate that customer satisfaction is experience accumulation once the demand for service quality has been met, whereas the service quality is the factor of customer satisfaction, and a significant correlation is shown between customer satisfaction and service quality. Based on the gap analysis model (that is, the PZB model developed by three scholars, Parasuraman et al., 1985, 1988), the superior or inferior quality is decided by the gap between expected service (ES) and perceived service (PS), while the source of service quality can be analyzed through the PZB model, and the administrator is thus allowed to have assistance for effectively improving service quality.

As a service provider, the service quality of itself must be improved, that is to say, to evaluate service quality level of one's own is essential above all, the important factors influencing service quality are required to be identified, followed by taking appropriate measures or strategies to improve service quality.

This issue must be highly concerned by service industry. In the viewpoint of customer, there are at least three types of perceived quality produced by various service quality offered by service provider (Grönroos, 2000), including: (1) high quality (that is, $ES > PS$); (2) acceptable quality (that is, $ES = PS$); and (3) bad quality (that is, $ES < PS$). The case of (1) and (2) are produced as perceived qualities, such service quality should be 'maintained;' however, when perceived quality (3) is produced, showing that such service quality should be 'improved.' Consequently, how to assess if the service quality provided by service providers meets requirements of the customers will be the research motivation of this research.

For measuring the service quality of school administration, school teachers are taken by this study as the first research targets, in order to facilitate the examination for recognizing if various attributes of administrative service quality (ASQ) are valued by customers? Or if they are factors for improving school service. For that reason, this study intends to apply the conception of importance-performance analysis (IPA) approach introduced by Martilla and James (1977) for carrying out analysis. The IPA approach is a useful method to evaluate service quality (Ennew et al., 1993; Huang et al., 2009; Leong, 2008; Wu et al., 2010; Yu and Shen, 2011). Since the importance level resulted from the IPA analysis signifies the importance of attribute evaluated by policy maker, and satisfaction indicates current performance status level and attitude of such attribute evaluated by policy maker. This paper hence intends to identify and summarize which are the ASQs valued by school through empirical investigation? Which are the important ASQs that must be maintained or improved?

To sum up, for determining if the concept of this study is sufficient to successfully operate, this study plans to

take elementary schools in remote rural area as research targets to perform empirical investigation of aforesaid issue. Specifically, the research purpose of this paper is to apply the IPA approach in measuring ASQs of elementary schools in Taiwan remote rural area.

MATERIALS AND METHODS

Some of the concepts used in this paper are briefly introduced. These include the preliminary ASQs, and the IPA approach.

Preliminary ASQs

As salient features of service quality include intangible, simultaneous occurrence of produce and consumption, perishability and heterogeneity, it is even more difficult to be evaluated than quality of tangible product. Nevertheless, lots of researchers overcome different obstacles and present various measurement models. Among others is the PZB model introduced by Parasuraman et al. (1985), and ten service quality dimensions have been developed, namely, tangibility, reliability, responsiveness, competence, courtesy, credibility, security, access, communication, and understanding, respectively. According to PZB model, service quality is the gap between service expected service and service perceived of customer during service transmission offered by service provider. Later, Parasuraman et al. (1988) simplified the PZB model and developed the SERVQUAL scale as well as five service quality dimensions, which are, tangibility, reliability, responsiveness, assurance, and empathy, respectively. Afterwards, Cronin and Taylor (1992) presented the SERVPERF scale as service measurement tool based on service performance. With the same opinion, Ting (2009) considers that the SERVPERF is superior to other models in evaluating school service quality.

The SERVQUAL model is one of the applicable models of measuring service quality; hence, this study uses this framework to obtain the preliminary ASQs of elementary schools in Taiwan. While interviewing the school principals and related administrators, a list of preliminary ASQs, as shown in Table 1, has been discussed and made known in academic publications and related literature review (Chen and Yang, 2003; Chen, 2008, 2009; Cheng, 2007; Ting, 2009; Wu, 2004, 2007).

The IPA approach

The systematic steps of evaluating schools' ASQs by using the IPA approach to be taken are described thus.

Step 1: Evaluate the degrees of importance and satisfaction of ASQs. Let x_j^h and y_j^h , $j = 1, 2, \dots, m$; $h = 1, 2, \dots, n$, be the importance value and satisfaction value, measured by Likert's 5-point scale, given to the j^{th} ASQs by the h^{th} teacher (decision-maker, DM), respectively. It can be expressed as $1 \leq x_j^h \leq 5$ and $1 \leq y_j^h \leq 5$.

Step 2: Integrate the opinions of all DMs by using the geometric mean technique, which is more effective in representing the multiple DMs' consensus opinions (Saaty, 1980). In this paper, we use this concept to aggregate all information generated by the questionnaires. Let I_j and P_j denote the consensus opinion evaluation values of importance and satisfaction of ASQs, respectively; then

Table 1. ASQs of elementary schools in Taiwan.

Dimension	Elementary schools' ASQs
Tangibility	Modern educational facilities (A1)
	A library with plentiful books (A2)
	Complete sport and play facilities (A3)
	Convenient and sanitation facilities of drinking water (A4)
	Green and beautiful campus environment (A5)
	Plentiful and clean toilets (A6)
	Free access for the disabled (A7)
	Well waste sorting and recycling, clean and comfortable campus (A8)
	Clean working environment (A9)
	Complete working facilities (computers, printers, copy machines, etc.) (A10)
	Clear administrative procedure (A11)
	Complete school website (A12)
	Delicious and nutritious lunch (A13)
	Neat and tidy faculty (A14)
Reliability	Correct and updated information (A15)
	Explicit schedule and certain practice (A16)
	Updated website information (A17)
	Well keep various archives/documents (A18)
	Be sure to check randomly student homework (A19)
	Perform thoroughly the resolutions made by various executive meetings (A20)
	Provide various forms of administrative operations (such as applications, registration, etc.) (A21)
	Register correctly the personnel services (salaries, insurance, leave, etc.) (A22)
Responsiveness	Implementation systematically health care services (A23)
	Administrative service are worthy of teachers staff's trust (A24)
	Quickly and explicitly handle suggestions put forward by teacher / student (A25)
	Effectively handle contingencies at the first time (e.g., injured students) or any emergency (A26)
	Immediately handle any shortage or recovery damaged facilities (A27)
	Administrative staff is able to quickly respond to any issue in detail (A28)
	Communication skills and EQ performance of each department / unit staff (A29)
	Flexibly and correctly handle administrative issue (A30)
Assurance	Offer assistance in organizing business trip and substitute / transfer (A31)
	Campus safety (A32)
	Department / unit staff is capable of responding teachers' concerns with expertise (A33)
	Attitude of staff delivering service (A34)
	Assist teacher progress professionally by using resources (A35)
	Respect teaching autonomy of teaching (A36)
	Plan training / study programs based on teachers' needs (A37)
	Offer teacher the information regarding curriculum design and teaching materials compiling (A38)
	Support teacher to develop teaching program and follow teaching schedule (A39)
	Encourage teacher to use various teaching methods and multiple assessment approaches (A40)
Continuously review and improve service quality (A41)	
Assist the arrangement of internal / external competition and provide support (A42)	
Empathy	Arrange self-strengthening activities, organize recreational activities for faculty and staff (A43)
	Department / unit staff took the initiative to communicate with teacher (A44)
	Listen and recognize the inner voice of teacher (A45)
	Offer channel for teacher to easily contact department / unit staff (A46)
	Arrange parent-teacher seminars and home visit (A47)

Table 1. Contd.

Empathy	Encourage the participation in various competitions and offer rewards (A48)
	Encourage job training courses for self-enrichment (A49)
	Department / unit staff can recognize the hard work paid by teaching group (A50)

The codes are shown in the parentheses.

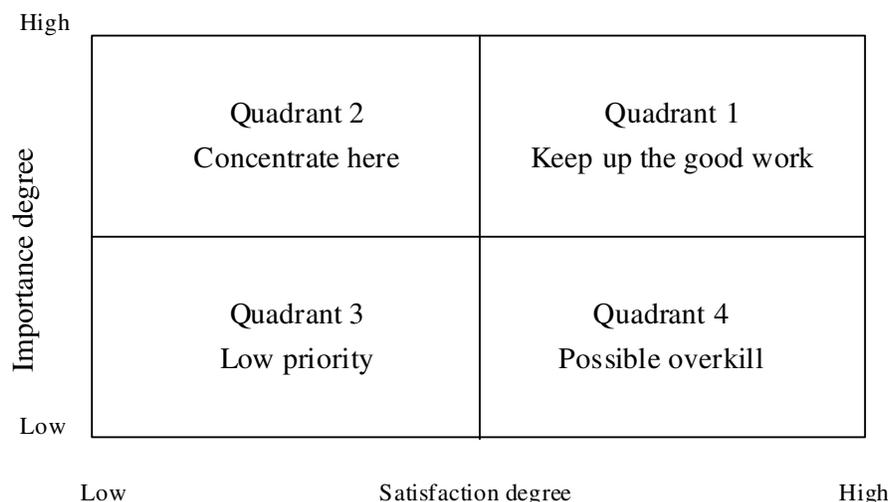


Figure 1. The importance-performance matrix. P.(2/3)

then I_j and P_j can be represented by $I_j = \left(\prod_{h=1}^n x_j^h\right)^{1/n}$ and $P_j = \left(\prod_{h=1}^n y_j^h\right)^{1/n}$, respectively.

Step 3: Set up the threshold values (TVs). In this paper, the TV of importance (that is, first TV) and the TV of satisfaction (i.e. second TV) of all questionnaires are calculated by the arithmetic mean of all m ASQs (Lu and Wu, 2010). That is, the first and second TVs

$$I_t = \sum_{j=1}^m I_j / m \quad \text{and} \quad P_t = \sum_{j=1}^m P_j / m$$

are , respectively.

Step 4: Plot the relative position of all ASQs as shown in Figure 1. The figure is plotted in a two-dimensional matrix, which is composed by 'keep up the good work' (in quadrant 1), 'concentrate here' (in quadrant 2), 'low priority' (in quadrant 3), and 'possible overkill' (in quadrant 4). That is:

- i. The quadrant 1 represents the importance and satisfaction values are relatively higher than first and second TVs. That means the ASQs in this quadrant should be 'kept up the good work.' The setting up standard of this quadrant is $I_j \geq I_t$ and $P_j \geq P_t$, respectively. This quadrant 1 is the place of competitive advantage for elementary schools.
- ii. The quadrant 2 represents the importance value is higher than

first TV, but the satisfaction value is lower than second TV. That means the ASQs in this quadrant should be 'concentrated here.'

The setting up standard of this quadrant is $I_j > I_t$ and $P_j < P_t$, respectively.

iii. The quadrant 3 represents the importance and satisfaction values are lower than first and second TVs. That means the ASQs in this quadrant is 'low priority.' The setting up standard of this quadrant is $I_j < I_t$ and $P_j < P_t$, respectively.

iv. The quadrant 4 represents the importance value is lower than first TV, but the satisfaction value is higher than second TV. That means the ASQs in this quadrant is 'possible overkill.' The setting

up standard of this quadrant is $I_j < I_t$ and $P_j > P_t$, respectively. Some resources of this quadrant can be transferred to the improved place for elementary schools.

Step 5: Obtainment of voice of customer (VOC) aims to calculate the weights of customer demands. Based on the study of Wu et al. (2008), the gap between the importance and satisfaction values of the j^{th} ASQ is multiplied by the importance value of the j^{th} ASQ. Then, we can obtain the original weights for the j^{th} ASQ. For being convenience to analyze, the original weights can be normalized to obtain the standardized weights of all ASQs. The ranking order of improvement of ASQs in elementary schools can be determined.

That is, the original weight of the j^{th} ASQ is $OW_j = (I_j - P_j) \times I_j$, the standardized weight is:

$$SW_j = \frac{OW_j}{\sum_{j=1}^m OW_j}$$

Table 2. Basic statistics data.

Item	Option	Frequency	Percentage
Gender	Male	30	36.14
	Female	53	63.86
Age (years old)	21-30	13	15.66
	31-40	54	65.06
	41-50	14	16.897
	51-60	2	2.40
	>65	0	0
Education	Bachelor or associate degree	57	68.67
	Master degree	26	31.33
	Ph.D degree	0	0
Seniority (years)	1-5	14	16.87
	6-10	36	43.38
	11-15	16	19.28
	16-20	7	8.43
	21-25	5	6.02
	>25	5	6.02
Position	Teacher as well as department head	8	9.64
	Teacher as well as group leader	20	24.10
	Grade school advisers	46	55.42
	Appointed teacher	9	10.84

Where, $0 \leq SW_j \leq 1$, $\sum SW_j = 1$

CASE STUDY

Questionnaire and data collection, and the IPA results are surveyed as follows:

Questionnaire and data collection

The questionnaire content aims to assess the importance and satisfaction of the fifty ASQs, as shown in Table 1. In order to examine whether the fifty ASQs are valued by the teachers of elementary schools at remote rural area in Taiwan, and whether they are factors that require improvement. The questionnaire of this study was based on a Likert 5-point scale, ranging from 1 for "very unimportant" (strongly dissatisfied) to 5 for "very important" (strongly satisfied).

Regarding the reliability analysis of the questionnaire, the Cronbach's α of the importance and satisfaction of the ASQs were 0.834 and 0.861, respectively, indicating good consistency of the questionnaire. As to validity analysis, the items in the questionnaire were based on academic literature and expert opinions; thus, the questionnaire content had a certain degree of content validity. The total score was subtracted by the score of

individual items, the new total-item correlation coefficient was 0.3, which was significant and indicated good construct validity. Since the correlation coefficients of items in this questionnaire were 0.513 to 0.826, they were significant and indicated good construct validity.

The questionnaire survey was carried out from November to December, 2010. In order to increase the return rate and representativeness of the questionnaire, the subjects were taken from several elementary schools and based on the perspective of teachers. A total of 105 questionnaires were distributed, and 83 effective samples were returned, for a valid return rate of 79.1%. Basic information in the questionnaire survey is reorganized in Table 2.

As shown in Table 2, males account for 36.14% and females 63.86%; most participants are 31 to 40 years old (65.06%); most graduated from college or university (68.67%); most are employed 6 to 10 years (43.38%), followed by 11 to 15 years (19.28%); most are grade school advisers (55.42%).

The results of IPA approach P. (1/3)

The results and processes are shown in Table 3. In summary, some important results raised are described further.

For the importance degree, the top five important ASQs

Table 3. The IPA results and the VOC.

Code	Geometric mean				The IPA results	VOC		
	Importance	Rank	Satisfaction	Rank		Original weights	Standardized weights	Rank
A1	4.435	16	3.669	26	Q 1	3.396	0.022	17
A2	4.485	12	3.059	48	Q 2	6.396	0.042	2
A3	4.336	22	2.988	50	Q 2	5.844	0.038	3
A4	4.751	1	3.538	38	Q 2	5.762	0.038	4
A5	4.358	21	3.662	27	Q 1	3.029	0.020	24
A6	4.646	3	3.035	49	Q 2	7.488	0.049	1
A7	4.304	28	3.542	37	Q 3	3.281	0.021	19
A8	4.471	13	3.660	28	Q 1	3.629	0.024	13
A9	4.231	37	3.355	46	Q 3	3.706	0.024	12
A10	4.634	4	3.649	30	Q 2	4.565	0.030	7
A11	4.334	23	3.686	24	Q 4	2.811	0.018	28
A12	4.226	38	3.708	21	Q 4	2.190	0.014	37
A13	4.490	11	3.424	45	Q 2	4.789	0.031	5
A14	4.082	49	3.910	6	Q 4	0.70	0.005	49
A15	4.495	10	3.633	31	Q 2	3.878	0.025	10
A16	4.520	9	3.866	7	Q 1	2.953	0.019	25
A17	4.217	39	3.695	22	Q 4	2.203	0.014	35
A18	4.291	30	3.843	8	Q 4	1.923	0.013	42
A19	4.088	48	3.945	4	Q 4	0.587	0.004	50
A20	4.275	32	3.826	10	Q 4	1.920	0.013	43
A21	4.155	44	3.754	16	Q 4	1.668	0.011	45
A22	4.568	5	4.090	1	Q 1	2.185	0.014	38
A23	4.395	19	3.834	9	Q 1	2.464	0.016	31
A24	4.427	18	3.689	23	Q 1	3.267	0.021	20
A25	4.523	8	3.722	19	Q 1	3.625	0.024	14
A26	4.713	2	4.056	2	Q 1	3.095	0.020	23
A27	4.309	26	3.536	40	Q 3	3.334	0.022	18
A28	4.314	25	3.585	35	Q 3	3.147	0.021	21
A29	4.430	17	3.469	44	Q 2	4.257	0.028	8
A30	4.379	20	3.522	42	Q 2	3.754	0.025	11
A31	4.463	14	3.966	3	Q 1	2.218	0.015	34
A32	4.560	6	3.775	14	Q 1	3.577	0.023	15
A33	4.273	33	3.673	25	Q 4	2.562	0.017	30
A34	4.334	23	3.772	15	Q 4	2.436	0.016	32
A35	4.265	34	3.713	20	Q 4	2.353	0.015	33
A36	4.560	6	3.533	41	Q 2	4.682	0.031	6
A37	4.237	36	3.608	34	Q 3	2.663	0.017	29
A38	4.143	45	3.463	43	Q 3	2.819	0.018	27
A39	4.137	46	3.610	33	Q 3	2.180	0.014	39
A40	4.201	42	3.737	18	Q 4	1.950	0.013	41
A41	4.179	43	3.653	29	Q 4	2.199	0.014	36
A42	4.308	27	3.585	35	Q 3	3.112	0.020	22
A43	3.920	50	3.741	17	Q 4	0.703	0.005	48
A44	4.209	41	3.537	39	Q 3	2.829	0.019	26
A45	4.293	29	3.309	47	Q 3	4.222	0.028	9
A46	4.265	34	3.789	11	Q 4	2.029	0.013	40
A47	4.121	47	3.786	12	Q 4	1.382	0.009	47
A48	4.214	40	3.785	13	Q 4	1.806	0.012	44
A49	4.281	31	3.901	5	Q 4	1.629	0.011	46

Table 3. Contd.

A50	4.441	15	3.629	32	Q 2	3.450	0.023	16
TVs	4.345		3.650					

Q1: quadrant 1; Q2: quadrant 2; Q3: quadrant 3; Q4: quadrant 4; TVs: threshold values.

are convenient and sanitation facilities of drinking water (A4), effectively handle contingencies at the first time or any emergency (A26), plentiful and clean toilets (A6), complete working facilities (A10), and register correctly the personnel services (A22), respectively.

For the satisfaction degree, the top five satisfactory ASQs are register correctly the personnel services (A22), effectively handle contingencies at the first time or any emergency (A26), offer assistance in organizing business trip and substitute / transfer (A31), be sure to check randomly student homework (A19), and encourage job training courses for self-enrichment (A49), respectively.

Eleven ASQs in quadrant 1 'kept up the good work' include modern educational facilities (A1), green and beautiful campus environment (A5), well waste sorting and recycling, clean and comfortable campus (A8), explicit schedule and certain practice (A16), register correctly the personnel services (A22), implementation systematically health care services (A23), administrative service are worthy of teachers staff's trust (A24), quickly and explicitly handle suggestions put forward by teacher/student (A25), effectively handle contingencies at the first time or any emergency (A26), offer assistance in organizing business trip and substitute/transfer (A31), and campus safety (A32), respectively.

Eleven ASQs in quadrant 2 'concentrate here' include a library with plentiful books (A2), complete sport and play facilities (A3), convenient and sanitation facilities of drinking water (A4), plentiful and clean toilets (A6), complete working facilities (A10), delicious and nutritious lunch (A13), correct and updated information (A15), communication skills and EQ performance of each department / unit staff (A29), flexibly and correctly handle administrative issue (A30), respect teaching autonomy of teaching (A36), and department / unit staff can recognize the hard work paid by teaching group (A50), respectively.

Ten ASQs in quadrant 3 'low priority' include free access for the disabled (A7), clean working environment Clean working environment (A9), immediately handle any shortage or recovery damaged facilities (A27), administrative staff is able to quickly respond to any issue in detail (A28), plan training / study programs based on teachers' needs (A37), offer teacher the information regarding curriculum design and teaching materials compiling (A38), support teacher to develop teaching program and follow teaching schedule (A39), assist the arrangement of internal / external competition and provide support (A42), department / unit staff took the initiative to communicate with teacher (A44), and listen

and recognize the inner voice of teacher (A45), respectively.

Eighteen ASQs in quadrant 4 'possible overkill' include clear administrative procedure (A11), complete school website (A12), neat and tidy faculty (A14), updated website information (A17), well keep various archives/ documents (A18), be sure to check randomly student homework (A19), perform thoroughly the resolutions made by various executive meetings (A20), provide various forms of administrative operations (A21), department/unit staff is capable of responding teachers' concerns with expertise (A33), attitude of staff delivering service (A34), assist teacher progress professionally by using resources (A35), encourage teacher to use various teaching methods and multiple assessment approaches (A40), continuously review and improve service quality (A41), arrange self-strengthening activities, organize recreational activities for faculty and staff (A43), offer channel for teacher to easily contact department/unit staff (A46), arrange parent-teacher seminars and home visit (A47), encourage the participation in various competitions and offer rewards (A48), and encourage job training courses for self-enrichment (A49), respectively.

In addition, the weights of customer demands can be obtained by step 5 of the IPA approach, obtainment of VOC. The analytical processes and results are as shown in Table 3. The VOC should be valued, and the top five ASQs that should be improved are as follows, plentiful and clean toilets (A6), a library with plentiful books (A2), complete sport and play facilities (A3), convenient and sanitation facilities of drinking water (A4), and delicious and nutritious lunch (A13), respectively.

Concluding remarks

This paper aims to evaluate the ASQs of elementary schools based upon the teachers' perspective at remote rural area in Taiwan by using the IPA approach. To facilitate the main issue for assessing the ASQs, the five dimensions with fifty factors are employed firstly. These initially important factors have been discussed and publicized in academic and management fields. Subsequently, the proposed IPA approach is used to measure these ASQs. Finally, the systematic appraisal approach is to perform the empirical survey via questionnaires. Study results show that:

1. Eleven ASQs are classified as 'kept up the good work'

in quadrant 1.

2. Eleven ASQs are classified as 'concentrate here' in quadrant 2.

3. Ten ASQs are classified as 'low priority' in quadrant 3.

4. Eighteen ASQs are classified as 'possible overkill' in quadrant 4.

5. The top five ASQs of the VOC should be improved. They are; plentiful and clean toilets (A6), a library with plentiful books (A2), complete sport and play facilities (A3), convenient and sanitation facilities of drinking water (A4), and delicious and nutritious lunch (A13), respectively.

Some discussions are remarked as follows:

1. The ASQ - plentiful and clean toilets (A6). In summary, the score of satisfaction degree is ranked on forty-nine; however, the score of VOC is ranked on top 1. In addition, this factor is positioned in 'concentrate here' of quadrant 2. The investigation results show that toilets numbers of elementary schools in remote rural area are in serious shortage, in addition, they are old, not clean - a problem frequently complained by teachers. The survey performed by this study indicates, with limited budget, these schools are unable to improve or expand toilet appliances; besides, the clean work is usually the responsibility of students, although the hygiene condition reaches students standard, but cannot meet that of teachers. The issue is therefore listed as the most required to be improved according to the survey of this study. The teachers are suggested to offer students more life education training, and highlight the importance of clean service through holding competition events, in order to provide a cleaner toilet to all the users.

2. The ASQ - a library with plentiful books (A2). In summary, the score of satisfaction degree is ranked on forty-eight; however, the score of VOC is ranked on top 2. In addition, this factor is positioned in 'concentrate here' of quadrant 2. As shown by this research result, since agricultural townships are in remote rural area, the library resources of schools located in rural or remote are in severe shortage, they are also in urgent need of more government budget or books denoted by people, in order to enrich library collection and expand library equipment.

3. The ASQ - complete sport and play facilities (A3). In summary, the score of satisfaction degree is ranked on fifty; however, the score of VOC is ranked on top 3. In addition, this factor is positioned in 'concentrate here' of quadrant 2. Compared with schools in urban area, those located at townships in remote rural are usually lacking resources, and in crucial need of government budget granted or social donations, so as to improve sport facilities and recreation equipment. These schools are suggested to continuously demand for higher government budget or hold fundraising events focusing on external customers, with the object to establish a better educational environment.

4. The ASQ - convenient and sanitation facilities of

drinking water (A4). In summary, the score of satisfaction degree is ranked on fifty; however, the scores of importance degree and the VOC are ranked on top 1 and top 4, respectively. In addition, this factor is positioned in 'concentrate here' of quadrant 2. Since the water quality of remote rural area has always been in poor condition, and budget allocated in most small/medium elementary schools are often insufficient, the goal of water quality improvement therefore has not been achieved yet, more government budget or social donations are truly in need for accelerating drinking water equipment improvement. These schools are suggested to constantly apply for more budgets or hold fundraising events focusing on external customers, in order to improve the situation.

5. The ASQ - delicious and nutritious lunch (A13). In summary, the score of satisfaction degree is ranked on forty-five; however, the score of VOC is ranked on top 5. In addition, this factor is positioned in 'concentrate here' of quadrant 2. As to the student lunch offered by school, this study suggests to invite internal staff with cooking expertise to participate, for continuously providing different dishes, and further improve the issue.

Moreover, the empirical results show that the elementary schools should listen attentively to the VOC to focus on improving these ASQs of customer requirements. It is suggested that more attentions should be paid to exploit these customer requirements effectively and then develop the profiles of solutions, which should continuously strengthen the perspective of customers. Furthermore, our key focus on these implications are as follows: (1) exploiting eleven 'kept up the good work' ASQs in quadrant 1; (2) strengthening eleven 'concentrate here' ASQs in quadrant 2, as well as paying attentions to develop profile of strategy on this quadrant; and (3) improving ten 'low priority' ASQs in quadrant 3 diligently.

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Full Length Research Paper

Assimilating entrepreneurial orientation and market orientation dimensions in the context of women-owned small and medium sized businesses

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Contemporary research exemplifies that an investment in employing an entrepreneurial orientation (EO) and market orientation (MO) strategies will assist small and medium sized businesses owned by women (WSMBs) in gaining success not only in short-term but over the longer period of time as well. Despite the significance of acquiring EO and MO to rejuvenate business performance, the distribution of EO and MO in literature is accounted as counter-productive. This argument advocate that an alignment amid EO and MO is advantageous for WSMBs, as it improves the business competitive ability to innovate and respond proactively to customers and market demands, which results in business growth and improved profitability. To this day, research has resulted in the development of EO and MO constructs, but literature accord no evidence whether the dimensions of EO and MO are related to each other in the context of WSMBs in developing countries of the world like Pakistan. This study examines the association amid dimensions of EO and MO, and findings suggest that all three dimensions of EO are positively associated with all three dimensions of MO in WSMBs context.

Key words: Entrepreneurial orientation, market orientation, women-owned small and medium sized businesses.

INTRODUCTION

The world is in a process of transformation, and sustainability of economic and social development is widely linked to the development of women as economic agents (Fujimori, 1995). This transition has globally patterned women entrepreneurial activities (Greene et al., 2003),

and made entrepreneurship a rewarding profession for women to grow and sustain, economically and independently. Women generally own small to medium sized businesses (WSMBs) and contribute significantly to world's innovation and economic growth. Contemporary competitive and dynamic market environment, coupled with demanding customers, now require firms of all sizes and nature to acquire entrepreneurial orientation (EO) and market orientation (MO) to grow and sustain profitably. EO explains the firm involvement in proactive and

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innovative strategies by entailing risk and is associated positively to firm performance, whereas, MO centres on customers and competitors and is connected strongly to firm performance. Despite the significance of acquiring EO and MO to rejuvenate business performance, the distribution of EO and MO in literature is accounted to be counter-productive as noted by McGrath and MacMillan (2000) and Wiklund and Shepherd (2003) that entrepreneurial success emerges when small and medium sized businesses (SMBs) employ creative and innovative thinking to shape the basic elements of firm's strategic marketing. The existing argument advocate that an alignment amid EO and MO is advantageous for SMBs and WSMBs (Baker and Sinkula, 2009), as it improves the business competitive ability to innovate and respond proactively to customers and market demands which results in business growth and profitability. Contemporary research exemplifies that an investment in employing an EO and MO strategy will assist SMBs and WSMBs in gaining success not only in short-term but over the longer period of time as well (Wiklund and Shepherd, 2005). To this day, research has resulted in the development of EO (Lumpkin et al., 2009; Covin and Slevin, 1989; Wiklund and Shepherd, 2005), and MO constructs (Kohli and Jaworski, 1990; Baker and Sinkula, 2005, 2007; Zhou et al., 2008; Narver et al., 2004), but literature accord no evidence whether the dimensions of EO and MO are related to each other in the context of WSMBs in developing countries of the world like Pakistan (Afza et al., 2010). Women entrepreneurs are deemed the corner stone of modern economic society and the growth and success of the free enterprise system is largely attributed to the energies and creativity of WSMBs (Brush et al., 2009; Schwartz, 1976). Majority of women entrepreneurs own small to medium sized businesses (Afza and Rashid, 2009) but unseemly, many of the developing and under-developed countries pay little intent to SMBs and WSMBs and tend to associate development with the growth of large-scale manufacturing industries. In Pakistan, there are 2 million SMBs; this includes 400,000 manufacturing units, 600,000 services units and approximately one million trade service units or retailers (Hassan, 2008). Deplorably, there are no sufficient data available on the economic value created by WSMBs to offer an accurate insight on the economic effect of WSMBs in various sectors of the economy (Bhutta et al., 2007). Although, WSMBs are regarded as panacea for economic problems confronted by the world today (Tamošiūnas and Lukošius, 2009), but little efforts have been devoted to the strengthening of WSMBs in many developing countries of the world. Recently, business and development studies delineated that the success and growth of WSMBs depends largely on the firm innovative ability (Covin et al., 2006) and marketing capabilities (Baker and Sinkula, 2007) in serving its customers and markets profitably (Baker and Sinkula, 2009). This relationship is sustained only when business creates and retains

its customers profitably over a longer period of time. The question pertains to, how WSMBs create this meaningful relationship which gives value to its customers and markets and also a potential profit to the firm. What strategic orientations are important for WSMBs long-term business growth and profitability? Literature illustrates that EO and MO contribute significantly to the growth and success of WSMBs, in this context; it is worth examining the relationship amid dimensions of both growth oriented strategic orientations such as EO and MO in the context of WSMBs in developing countries like Pakistan where women-owned businesses are on the rise.

THEORETICAL BACKGROUND AND HYPOTHESIS

Three conceptual models are developed based on the precepts of entrepreneurship, strategic marketing and strategic management literature. These models delineate the likely relationships among the components of both EO and MO constructs. Both EO and MO comprises of three dimensions. EO consists of risk-taking, innovativeness and proactiveness, whereas, MO comprises of competitor orientation, customer orientation and inter-functional coordination. Figures 1, 2 and 3 depict the relationships among the components of EO and MO. These relationships are hypothesized to provide pervasive understanding amid EO and MO dimensions and are based on the theories discussed in entrepreneurship and strategic marketing literature.

Proactiveness and dimensions of MO

EO influence on business performance has largely been argued by entrepreneurship scholars, and empirical evidences illustrate the EO positive performance implications for SMBs (Wiklund, 1999; Baker and Sinkula, 2009). Parallel to EO, MO is another dominant construct which impact positively on business performance; MO is an adaptive mechanism and is positively associated to EO in exploiting uncertain market environments (Miles and Arnold, 1991).

Scholars debate that market-oriented firms are reactive in nature and are likely to let pass valuable opportunities for creating new products and services which are based on the customers unexpressed needs (Hamel and Prahalad, 1994; Atuahene-Gima and Ko, 2001), therefore, it is imperative for the firms to align the proactive focus of EO to successfully meet the expressed and future needs of the customers and markets (Covin and Slevin, 1991; Atuahene-Gima and Ko, 2001). Though aligning the proactive dimension of EO with the dimensions of MO presents a persuasive argument, yet little or no empirical evidence prevail to support the alignment of EO dimension of Proactiveness with the dimensions of MO in WSMBs context. Figure 1 plots the relationships

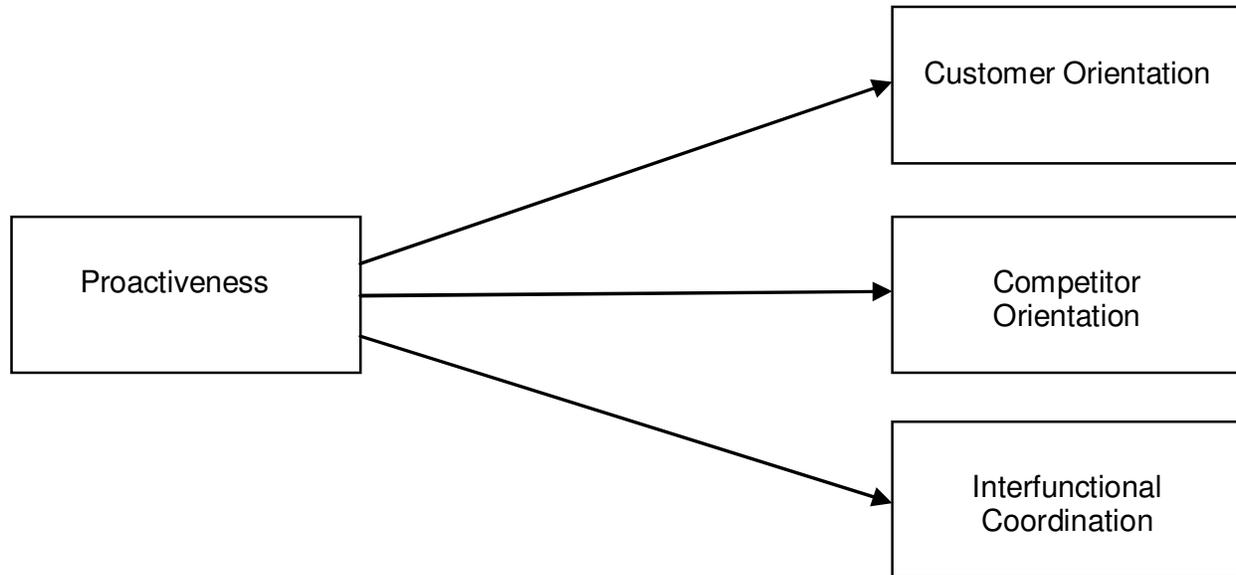


Figure 1. Relationship between proactiveness and dimensions of MO.

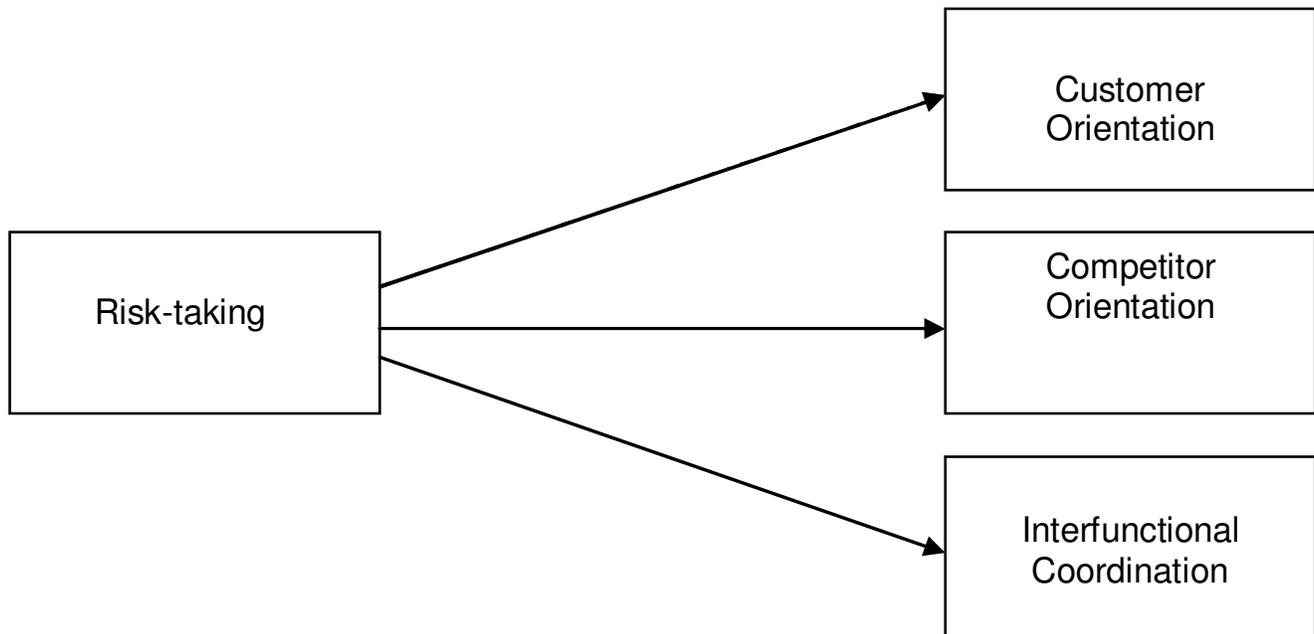


Figure 2. Relationship between risk-taking and dimensions of MO.

amid proactiveness and dimensions of MO.

Proactiveness and customer orientation

Proactiveness relates to a stance of foreseeing and responding to customer future needs and wants, thus, generating a pioneering advantage over competitors, whereas, customer orientation concerned with creating

value for current customers through gaining adequate understanding of customers expressed needs (Narver and Slater, 1990; Alpkan et al., 2007). The recent advances in production technologies, information and communication technologies as a result of globalization and internationalization have created highly competitive and dynamic domestic markets alongside with sophisticated and informed customer groups (Knight and Cavusgil, 2004). The reactive nature of MO does not

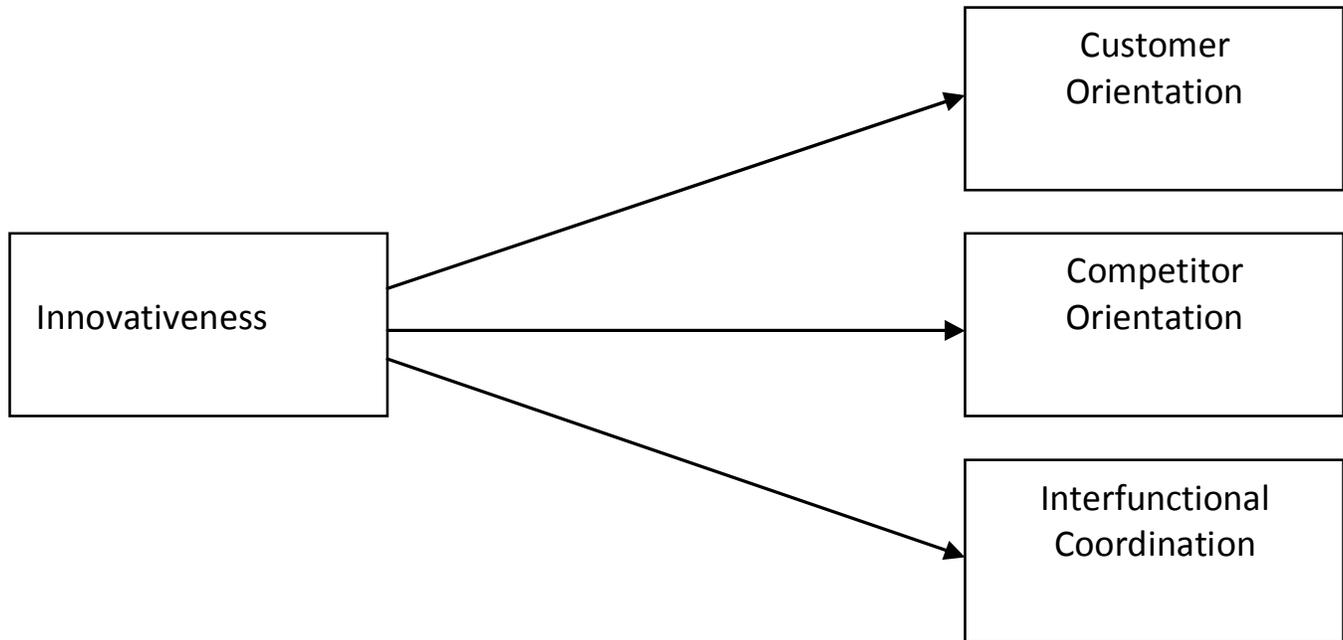


Figure 3. Relationship between innovativeness and dimensions of MO.

alone permit the WSMBs to define the future opportunities which are based on customers latent or unexpressed needs, whereas, customer orientation demands proactive disposition to provide continuous value and satisfaction to existing and future customers (Danneels, 2003; Alam, 2010). Therefore, it is fundamental for WSMBs to align the proactive stance to develop a customer oriented culture in order to successfully meet the expressed and future demands of the customers. Accordingly, it is hypothesized that:

H₁: Proactiveness is positively associated to customer orientation in WSMBs context.

Proactiveness and competitor orientation

The proactive stance will enable WSMBs to carefully study the competitor's actions and strategies to define the strengths and weaknesses of rivals (Narver and Slater, 1990; Dimitratos et al., 2010). The classical business failure reasons noted by Timmons and Spinelli (2007) include ignorance about competition. The authors argue that it's easy for a company to die simply by staying in a dark room, but to remain profitable, it requires, on the part of the firm, to be proactive and focus closely on the competition. That is, the proactive stance of WSMBs will promote a competitor oriented culture accentuating these WSMBs to continuously generate information about competitor's actions, strategies and capabilities. The ideology behind the positive relationship amid proactiveness and

competitor orientation is due to competitive nature of the domestic market structure and the presence of large rival firms. The growth of WSMBs will depend largely on developing a competitor oriented culture, the culture which stresses on defining the competitor's weaknesses and would permit WSMBs to make use of proactive stance to shape their own competitive strategies to serve customers and markets profitably. Thus, it is hypothesized that:

H₂: Proactiveness is positively associated to competitor orientation in WSMBs context.

Proactiveness and interfunctional coordination

The productive outcome of developing customer oriented culture and competitor oriented culture depends largely on the WSMBs level of interfunctional coordination; defined as a process that incorporates information pertaining to customers, markets and competitors and allow logical action on the part of the firm (Narver, Slater and Maclachlan, 2004; Alam, 2010). The proactive stance permits the firm to develop an embedded customer and competitor oriented culture which in return instigates the collection of information about customers, markets, environments and competitors (Baker and Sinkula, 2007).

The proactive approach together with interfunctional co-ordination will create an environment in which sharing of information among individuals and various business functions will be promoted and would result in efficient

decision making.

The WSMBs proactive approach will create a sense of urgency among the employees to respond quickly to the environmental challenges. This in result would improve the employee level of commitment to advance the firm market performance (Blankson and Cheng, 2005; Kennedy, Goolsby and Arnould, 2003; Vijande et al., 2008). Accordingly, it is hypothesized that:

H₃: Proactiveness is positively associated to interfunctional coordination in WSMBs context.

Risk-taking and dimensions of MO

Risk-taking is posits to have a negative influence on customer orientation (the dotted line signify the negative influence of risk-taking on customer orientation) as literature illustrates the fact that WSMBs are reported to be risk averse, as they lack material resources and expertise to invest in uncertain environment. Furthermore, WSMBs have the tendency to play safe and they prefer to focus on the existing customers and markets need and commit resources to satisfy the customers expressed and unmet needs (Afza, Osman and Rashid, 2010). Therefore, risk taking posits to be negatively associated to customer orientation for WSMBs, whereas, risk-taking is hypothesized to have a positive impact on competitor orientation and interfunctional coordination. Figure 2 illustrates the hypothesized relationships amid risk-taking and the dimensions of MO.

Risk-taking and customer orientation

Risk-taking is defined as firm readiness to commit resources in uncertain environment and situation through the introduction of new products or services, exploring new segments for products or services and investing in new projects (Lumpkin and Dess, 1996; Tajeddini, 2010). Though it has been argued a lot among the scholars that customer oriented firms are risk averse as they tend to focus on customer's existing needs and wants, and commit resources to serve the existing customers (Jaworski et al., 2000). Correspondingly, WSMBs are reported in literature as risk averse because they lack material resources and expertise to invest in uncertain environment (Talat et al., 2010; Baker and Sinkula, 2009). They instead, prefer to focus on the existing customers and market needs and commit resources to satisfy the customers expressed and unmet needs (Fairoz et al., 2010). Thus, it is hypothesized that:

H₄: Risk-taking is negatively associated to customer orientation in WSMBs context.

Risk-taking and competitor orientation

Risk-taking is hypothesized to be positively linked to competitor orientation in case of WSMBs. The marketing paradox transacts with the dilemma of whether firms should be proactive or reactive, or should they maintain a balance on the continuum to be reactive and proactive simultaneously (Narver et al., 2004). Conner (1999) is of the opinion that maintaining a balance on the continuum would allow the firm to generate funds being reactive and satisfying the customer current needs and concurrently using the funds to invest in new and risky projects through new product development and entering new markets to out compete the rival firms. WSMBs are usually competitive as they tend to focus on the opportunities in the segmented markets based on the defined weaknesses of the competitors, thus, competitor oriented approach together with the quest to outperform competitors make WSMBs prone to risk-taking. Therefore, it is hypothesized that:

H₅: Risk-taking is associated positively to competitor orientation in WSMBs context.

Risk-taking and interfunctional coordination

The inclination of WSMBs to initiate risk and stay ahead of competition requires high level of interfunctional coordination to reach timely decisions. Literature illustrates that small firms are leaders in experimentation and innovation, which results in technological change and growth (Gudmundson et al., 2003; Kuratko and Hodgetts, 2001). Being risky is a trait of WSMBs, as their birth in the face of competition is a risky ride on an uncertain avenue. Risk-taking nature of WSMBs initiates a sense of responsiveness among the individuals and various functions of the business (interfunctional coordination) to assimilate the facts pertaining to customers and competitors which permit logical actions. For that reason, the risk-taking nature of WSMEs will develop a sense of responsiveness among individuals and various functions of the business (interfunctional coordination) to respond efficiently to the existing and future opportunities in the market place (Kennedy et al., 2003). Thus, it is hypothesized that:

H₆: Risk-taking is positively associated to interfunctional coordination in WSMBs context.

Innovativeness and dimensions of MO

Innovativeness has been reported to be strongly rooted in WSMBs as SMBs are deemed as leaders in experimentation and innovation (Okpara and Kabongo, 2009). Innovativeness is now recognized as an organizational culture and defined as a business ideology to embrace

new ideas and experimentation which results in the development of new products and technological processes (Hurley et al., 2005). Innovativeness symbolizes the firm's strategic stance which signifies the firm readiness to critically evaluate the environment for the purpose of creating space for innovating new products and defining creative ways to explore new markets. The ever growing competition and shortened product and market life cycles stresses firms to strategically orient their postures towards innovativeness to ensure the profitable survival of the firm (Frank et al., 2010). Figure 3 plots the hypothesized relationships amid innovativeness and dimensions of MO.

Innovativeness and customer orientation

Innovative WSMBs stay close to the customers and markets to make note of their changing needs. Innovativeness is now recognized as an organizational culture and defined as a business ideology to embrace new ideas and experimentation that results in the development of new products and technological processes (Okpara and Kabongo, 2009). The growing rivalries and speed of innovation require innovative WSMBs to be customer oriented, which would permit these WSMBs to be responsive to the changing customer's existing and latent needs through innovating news products and services. Mixed literature illustrations on the relationship between innovativeness and customer orientation report that customer orientation had a negative impact on product innovation and new market development as staying close to customers will limit innovation in high-technology firms (Im and Workman, 2004; Woodside, 2005). It is contend in this study that the ever growing competition and shortened product and market life cycles stresses firms to strategically orient their postures towards innovativeness, and the strategic innovative posture if supplemented by customer orientation would result in profitable survival of the firm (Frank et al., 2010). Thus, innovativeness will positively influence the customer orientation focus of the WSMBs and accordingly it is hypothesized that:

H₇: Innovativeness is positively associated to customer orientation in the context of WSMBs.

Innovativeness and competitor orientation

An innovative firm tends to always study the competitor's moves and strategies to define their strengths and weaknesses, as differentiating from competitors is a trait of an innovative firm. Innovative firms with strong customer orientation have a tendency to evaluate their offerings

against rival firms for the positional advantage (Im and Workman, 2004). Therefore, innovativeness as an organizational culture will positively influence the competitor orientation focus of the firm as defining rival's strengths and weaknesses will facilitate the creative flow of products and services and strengthen the innovative culture in WSMBs (Narver and Slater, 1990). Thus, this study posits that:

H₈: Innovativeness is positively associated to competitor orientation in the context of WSMBs.

Innovativeness and interfunctional coordination

Innovativeness as an organizational culture may serve as momentum to interfunctional coordination. Innovative culture will foster the need of improved functional coordination among all functions of the business to expedite the flow of shared communication among individuals and departments (Im and Workman, 2004). Improved coordination among individuals and all functions of the business as a result of innovative culture will give firms an opportunity to embrace new ideas and technologies in an open environment, thus, enhancing the individual and team collective efficiency to contribute positively to innovativeness or vice versa. Thus, this study conjectures:

H₉: Innovativeness is positively associated to interfunctional coordination in the context of WSMBs.

METHODOLOGY

To test the research hypotheses, this study briefly discusses the research methodology employed. The study's methodology is divided into three parts. First, the target population and data collection method was delineated, after which the scales were adapted to measure the variables and data analysis techniques respectively.

Target population and data collection method

Target population of the study consists of WSMBs (women-owned small and medium sized businesses) registered with Federation of Chamber of Commerce and Industries (FCCI) and Small and Medium Enterprise Development Authority (SMEDA) in the province of Punjab, Pakistan. Survey questionnaire was developed based on the established EO and MO scales. A total of 400 WSMBs were randomly approached and 303 agreed to participate in the survey (182 manufacturing, 65 services and 56 retail/trade firms). This study made use of the single-informant method as representative of the firm to gather data from WSMBs, as EO and MO have established as firm level constructs and reported firmly rooted in organizations (Knight and Cavusgil, 2004). Researchers have advocated numerous reasons to explain the effectiveness of single-respondent approach over multiple-respondent approach; first, single-informant approach is cost effective, second, it permits the researcher to involve more respondent companies and generate a

higher response, third, it does not complicate the data set as multiple responses from the same company could complicate the analysis process, and lastly, most empirical researches in EO and MO streams preferred single-informant approach (Olson, Slater and Huly, 2005). In the context of WSMBs, CEO, founding, or managing entrepreneurs are always considered the operational and strategic heads and are considered the most likely informants because of their level of involvement in the overall running of the firm, and in the same context, this research classified the single-respondent as "founding or managing entrepreneur" and also the key respondent.

Measures

All measures used in this study are grounded in literature and adopted with modification to be used in the context of this study. Three dimensions of EO were measured with a revised version of (adjusted for terminology suitable for WSMBs) twelve items, seven-point scale based on the scales developed and, tested for validity and reliability by various leading entrepreneurship researchers (Covin and Slevin, 1989, 1991; Khandwalla, 1977; Lumpkin and Dess, 1996; Miller and Friesen, 1982). Of the three dimensions of EO, innovativeness was measured with five items anchored scale developed by Miller and Friesen (1982) and acclimatized for use in small firms by Covin and Slevin (1989).

The questions solicit respondents to evaluate: 1) the degree to which firm emphasizes R and D and innovativeness; 2) to what extent firm has added to its line of products/services; and 3) the level of changes in product line/services.

The last two items are adapted from the scale of Lumpkin (1998) which measures the firm innovativeness in developing new processes by soliciting, if innovative approaches to problem solving and development to production mechanisms are significant to firm. Proactiveness was measured with three items on 7-point scale. Two items out of the three measures of proactiveness were adopted from the scale developed by Covin and Slevin (1989) and one measure adopted from the scale developed by Lumpkin (1998).

The questions ask respondents to assess: 1) the firm proclivity to leap forward to seize opportunities and be the first to develop and introduce new products, services, technologies and processes; 2) the firm approach of acting ahead of competitors in predicting about future changes or needs; and 3) firm propensity to lead rather than following the competitors in introducing new products and services. Risk-taking was measured with four items on 7-point scale developed by Covin and Slevin (1989).

The questions require respondents to appraise: 1) firm tendency to engage in risky ventures; 2 and 3) firm leaning for bold versus careful acts in accomplishing firm targets; and 4) how firm risk-taking propensity accentuate firm decisions to allocate resources.

Whereas, all three dimensions of MO were measured with a revised version (adjusted for terminology suitable for WSMBs) fifteen items, seven-point scale based on scale developed and tested for validity and reliability by Narver and Slater (1990).

Of the three dimensions of MO, customer orientation was measured with six items anchored scale developed by Narver and Slater (1990). The questions solicit respondents to evaluate firm customer orientation in terms of: 1) monitoring the firm level of commitment to serving customer needs; 2) firm objectives are driven by customer satisfaction; 3) competitive advantage is based on the firm understanding of customer needs; 4) strategies are aligned with firm belief to continuously create value for customers; 5) measuring customer satisfaction sporadically; and 6) closely following customers for after-sales services. Competitor orientation was measured with four-items on 7-point scale developed by Narver and Slater (1990). The questions ask respondents to assess firm competitor orientation in terms of: 1) firm inclination to quickly respond to the competitor threatening actions; 2) sales and

marketing people regularly share information pertaining to competitor actions; 3) management regularly discusses the competitor strengths and actions; and 4) firm target customers following an opportunity for competitive advantage. Interfunctional coordination was measured with five items on 7-point scale developed by Narver and Slater (1990). The questions enquire respondents to evaluate the firm level of interfunctional coordination in terms of: 1) firm functions of the business are integrated in serving the needs of target markets; 2) firm functions of the business are responsive to each other's needs to collectively serve the market needs efficaciously; 3) firm all functions of the business share information pertaining to successful and unsuccessful customer experiences; 4) entrepreneur/manager understand the capacity of everyone in business in terms of their contributing capacity to create value for customers; and 5) resources are shared among all the functions of the business.

Data analysis techniques

Data collected were coded and entered into SPSS 17 for analysis, subsequently; reliability scores for each construct were calculated through Cronbach alpha (α) and depicted in Table 1. Further, the score for each variable was computed by summing all scores of items measuring a particular construct and divided by the number of items measuring that construct. Finally, Pearson correlation coefficients were computed to test the proposed relationships amid the dimensions of EO and MO, and results are summarized in Table 1.

RESULTS

The proposed relationships among the dimensions of EO and MO were tested using Pearson correlation coefficients; the correlation coefficients in Table 1 depict significant correlations amid the dimensions of EO and MO in WSMBs context. Results indicate that all three dimensions of EO have positive relations with the dimensions of MO and their relationships are statistically significant at ($p < 0.01$).

All study hypotheses are substantiated except for H_4 , which resulted otherwise. Hypotheses H_1 , H_2 and H_3 suggest that proactiveness is positively associated with customer orientation, competitor orientation and interfunctional coordination. All three hypotheses are supported by the data; customer's orientation ($r = 0.46$, $p < 0.001$), competitor's orientation ($r = 0.35$, $p < 0.01$), and interfunctional coordination ($r = 0.56$, $p < 0.01$). Hypotheses H_4 , H_5 and H_6 propose that risk-taking is negatively associated with customer orientation (H_4) but positively associated with other two dimensions of MO, that is, competitor orientation and interfunctional coordination. Hypotheses H_5 and H_6 are supported by the data but H_4 is refuted by the data since data suggest a positive association of risk-taking with customer orientation in the WSMBs context with coefficients values; customer's orientation ($r = 0.45$, $p < 0.001$), competitor's orientation ($r = 0.50$, $p < 0.01$), and interfunctional coordination ($r = 0.59$, $p < 0.01$). The last set of hypotheses H_7 , H_8 and H_9 suggest that innovativeness is positively associated with all three dimensions of MO in

Table 1. Means, standard deviations and Pearson correlation for EO and MO constructs (N = 303).

Variable	Mean	SD	1	2	3	4	5	6
1	4.64	1.90	(0.87)†					
2	4.65	1.88		(0.92)†				
3	4.67	1.85			(0.78)†			
4	4.72	1.77	0.46**	0.55**	0.45**	(0.83)†		
5	4.78	1.85	0.35**	0.39**	0.50**		(0.86)†	
6	4.75	1.84	0.49**	0.56**	0.59**			(0.79)†

1** Correlation is statistically significant at the 0.01 level (1 tailed); 2. † The bold values in parentheses are the reliability scores of the measures; 3. Mean shows the average score of respondents' responses; 4. SD shows standard deviation in respondents' responses; 5. "1" = Innovativeness, "2" = proactiveness, "3" = risk taking, "4" = customer's orientation, "5" = competitor's orientation, "6" = interfunctional coordination.

WSMBs context and are well supported by the data with coefficients values; customer's orientation ($r = 0.55$, $p < 0.001$), competitor's orientation ($r = 0.39$, $p < 0.01$), and interfunctional coordination ($r = 0.49$, $p < 0.01$).

DISCUSSION

Earlier studies of small and medium sized businesses have investigated the singular impact of EO and MO on business performance, but rarely have determined the association among the dimensions of EO and MO in the context of women-owned SMBs. Moreover, most of the studies on EO and MO have been carried out in market-driven economies where the institutional and market environments are well established. Concerns arising from conservative and transitional economies especially for businesses owned by women have not been awarded appropriate attention. Considering the significant role WSMBs play in conservative and transitional economies in employment creation, international trade and domestic wealth has profound implications for research and practices. To fill the void, this study was undertaken to examine the relationships among the dimensions of EO and MO in WSMBs context in Pakistan.

To sum up the results, this study proffers strong support to the study hypotheses presented in Figures 1, 2 and 3. First, the findings confirms that proactiveness as dimension of EO is significantly and positively related to all three dimensions of MO, that is, customer orientation, competitor orientation and interfunctional coordination. This signifies that aligning proactiveness with dimensions of MO in WSMBs context can drive them to identify potential opportunities ahead of competitors and creating products and services based on the customers expressed and latent needs. This result supports the researches of Zehir and Eren (2007) and Low et al. (2007) who found the positive relationship between proactiveness and dimensions of MO (customer orientation).

Further, the study results demonstrate that risk-taking is positively associated to all three dimensions of MO, though study posits that risk-taking is negatively associated to customer orientation in WSMBs context. The positive association between risk-taking and customer orientation as suggested by the data contradict the results of Cadogan and Siguaw (2002), who advocated that customer orientation reduces risk-taking, one plausible explanation for such a finding could be that WSMBs birth at the face of competition inclined them concurrently to be customer orientated and risk prone, as customer's pervasive understanding tend to intensify the WSMBs level of confidence to embark on risky ventures robustly. Finally, it substantiated as expected that innovativeness is positively associated to all three dimensions of MO for the reasons that innovativeness symbolizes the firm's strategic stance which signifies the firm readiness to critically evaluate the environment for the purpose of creating space for innovating new products and defining creative ways to explore new markets.

The ever growing competition and shortened product and market life cycles, stresses firms to strategically orient their postures towards innovativeness to ensure the profitable survival of the firm (Frank, Kessler and Fink, 2010).

MANAGERIAL AND FUTURE RESEARCH IMPLICATIONS

The result of the study revealed few managerial implications. First, the study demonstrates that EO and MO are beneficial for WSMBs in conservative and transitional economies. Correspondingly, CEO or top managers of WSMBs should endeavour to acquire EO and MO as decisive components of firm's strategic profile. With reference to future research perspective, the context-specific results of the current study should be viewed vigilantly when extended to other contexts.

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Full Length Research Paper

A profitability study on the Malaysian futures markets using a new adjustable technical analysis indicator, adjustable bands Z-test-statistics' (ABZ')

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Financial markets all over the world generally exist in 2 conditions: trending and ranging. One of the most frustrating issues confronting market technicians daily is the critical definition when market is ranging and when the market is trending. Applying a trending algorithm to a ranging market will result in whipsaws that yield losses. To avoid some of these false entry signals, this research proposed to vary the moving average and standard deviation parameters to avoid some of these false entry whipsaws and yet capture a new trend early. Adaptive algorithm like the Adjustable Bands Z-Test-Statistics' (ABZ'), seeked to provide a solution to this issue. For the year 2008, ABZ' showed an abnormal return of 316 index points for Malaysian Kuala Lumpur Composite Index Futures (FKLI) compared with a negative return of -562 index points for the passive buy-and-hold strategy and 690 for Malaysian Crude Palm Oil Futures (FCPO) compared with a negative return of -1387. Results from this research interest investors world wide who are trying to overcome this baffling issue of ranging versus trending markets.

Key words: Technical analysis indicators, automatically adjustable algorithm trading systems futures trends.

INTRODUCTION

Adaptive algorithm trading systems are the future of technical trading rules in financial markets. This can be seen in the new emerging combination of technical trading rules in genetic programming, artificial neural networks and now, adaptive bands z-test statistics. An adaptive algorithm trading system is defined as an automated trading system that can adjust its parameters to adapt to the current market condition. The special feature of an adaptive algorithm trading system is its ability to automatically adjust its parameter to become a large variable in range trading period, and to become a small variable in trend trading period. The technical trading system functions according to the inherent algorithm which first recognises the state the market is in, ranging

or trending, and then adjusts the parameters accordingly.

Balsara et al. (1996) write that flexible trading systems that can adjust its parameters automatically to changes in market conditions, are the key to success in any technical trading programmes in the futures market. The technical trading system basically consists of a set of trading rules selected after a series of tests, to generate trading signals. The trading rules consist of algorithms with optimised parameters to indicate trading signals. The trading signal is either to extend or to shorten a futures contract.

Therefore, this research shall develop from a set of trading rules, on adaptive bands to become an algorithm trading system, called Adjustable Bands Z-Test-Statistics' (ABZ') that professional market technicians can use on the model trading desk. Algorithmic trading (also known as Automated, Algo, Black Box or Robo Trading) is the science of finding an algorithm that is suitable to the prevailing market condition and automatically executing

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the trading signal by a computer programme. An algorithm trading system is used because historically, it has been tested and proven to have an statistical edge in generating positive abnormal return above the buy-and-hold policy. The choice and implementation of an algorithm trading system can be the defining factor to determine the overall profit or loss of the financial institution for each accounting period. The benefit of using an algorithm trading system is all trading decisions are objective and quantifiable, which means that every trade can be accounted for by the algorithm when audited. This ensures that all trades, profits and losses are systematic, with no drastic, unexpected huge losses of gigantic nature compared to its paid up capital. Algorithm trading system involves not only signal generation but also automated stop loss. Therefore, all losses are expected.

The novelty of this research lies in the conception of efficacy ratio, a new technical indicator that is adaptive in nature, used to design and develop ABZ' algorithm trading system. ABZ' is designed to overcome some of the common problems encountered by trend trading systems.

According to Chande (1997), a trading system is used to gain a statistical edge, objectivity and consistency. The trading system must be robust. A robust trading system is defined as one that can withstand a variety of market conditions across many markets and timeframes. The trader can trade in timeframes of seconds, minutes (5, 10, 15, 30), hourly, daily and weekly. Two of the most important conditions for traders are:

- i. Range market when there is little price movement which results in small gains for the range trader and small losses for the trend trader.
- ii. Trend market when there is large price movement which results in huge gains for the trend trader and huge losses for the range trader.

The trading system must be backtested to withstand these two very different market conditions and the results of these tests must be positive. As Chande (1997) puts it, the trading system must have a positive expectation. He also states that the most important reason to use a trading system is to gain a statistical edge. This statistical edge also refers to the probability of ruin. The smaller the probability of ruin, the more likely the trader survives and profits from the trading system in the long run.

Objectives

The new algorithm trading system, ABZ', is designed, using moving average and standard deviation technical indicators to generate automatically adaptive parameters to fit historical and current data. ABZ' has a return to risk ratio of at least more than 1.5, it has low maximum drawdown with inherent loss control mechanism due to the adaptive nature of moving average and standard

deviation, the number of winning trades to losing trades is 50:50 and the average gain is at least 1.5 times larger than average loss.

ABZ' uses efficacy ratio to automatically adjust its parameters, moving average and standard deviations to suit the two different market conditions. The trading rules for ABZ' are buying long above the upper standard deviation band, selling short below the lower standard deviation band and not trade within the bands. ABZ' is expected to capture a larger portion of abnormal profits by automatically adjusting the parameters according to the prevailing market condition, thus:

- i. Narrowing the bands width to enter a new trend early in a trending market.
- ii. Widening the bands width to avoid some whipsaws when the market is ranging.
- iii. Constantly adjusting the parameters to stay with the major trend movement for as long as possible.

LITERATURE REVIEW

This investigation addresses Fama (1965) challenges to anyone with more than a passing interest in price behavior. The test approach is similar to that of Lukac et al. (1988) to test for statistically significant returns. This study is based on the insights of Mandelbrot and Hudson (2004)'s proof that market is not random. Mandelbrot and Hudson (2004) observes that markets are ruled by power curves, and not normal probability curves, and that long-term dependence of sequential price action exists. Lukac et al. (1988), Brock et al. (1992), Bessimbinder and Chan (1995) and, Irwin and Park (2009), demonstrate that the technical trading systems generally generate abnormal returns larger than that by the passive buy-and-hold policy. These studies test different mechanical technical trading systems and find evidence consistent with technical analysis being able to identify trends for the purpose of trading profitably.

Brock et al. (1992) test 10 variable-length-moving-average technical rules and 10 fixed-length-moving average rules and 6 trading-range-break rules using Dow Jones Industrial Average. Brock et al. reject the hypothesis that the technical rules in aggregate have no predictive power for return. This finding is very significant because many others like Bessimbinder and Chan (1998) based their studies on the methods used by Brock et al. (1992) to test and achieve significant positive results. This study adopts a similar approach to that of Lukac et al. (1988) and uses some of the tests selected by Brock et al. (1992) and Bessimbinder and Chan (1995) with an improvised technique, ABZ' to identify and trade trends for abnormal returns greater than that by the buy-and-hold policy.

This study draws support from Gandolfi et al. (2008), especially for its concept on dynamic volatility indicator,

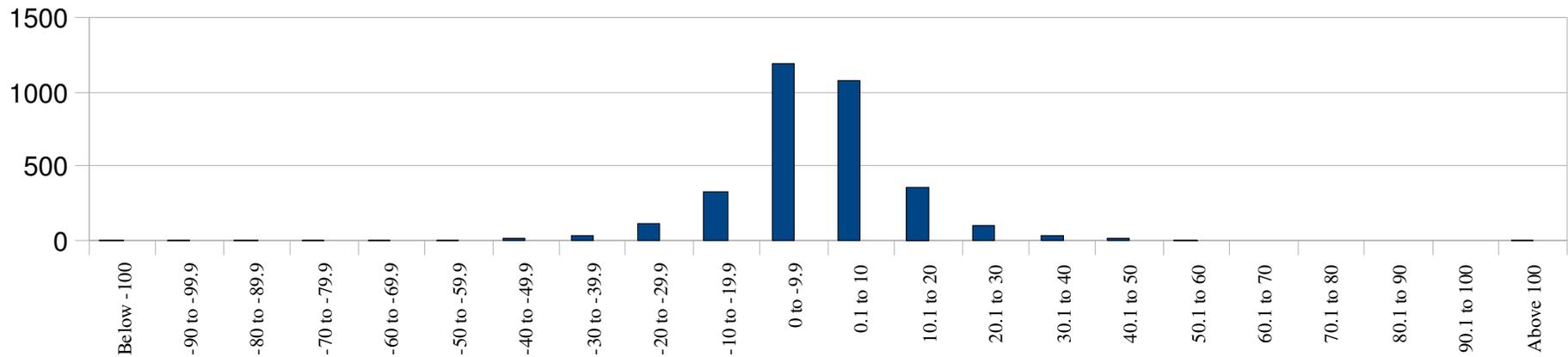


Figure 1. Daily FKLI returns distribution from 15/12/1995 to 31/12/2008.

namely standard deviation that is used to adjust the moving average. In Gandolfi's paper, the 10-day standard deviation of closing prices is divided by a parameter defined by the average of the standard deviation over a 50-day period. This ratio of the 10-day standard deviation of the closing prices divided by the 50-day average of the standard deviation of the closing price defines the excess "volatility" relative to its historical average value.

In this paper, we propose to use a ratio of 34-day standard deviation for long term indicator over 6-day standard deviation for short term indicator. This new indicator is called Efficacy Ratio. When market is ranging, that is when market is moving sideways without any particular direction, the Efficacy Ratio generated is a larger value parameter. This ensures a longer moving average, larger standard deviation bands and thus some of the short term whipsaw losses can be avoided. In a trending market, Efficacy Ratio is a smaller value parameter for moving average and standard deviation, thus ensuring a faster entry into the

prevailing trend.

DATA ANALYSIS

Our study begins with data statistics. The data collected is the closing prices of FKLI from its inception on 15th December 1995 to 31st December 2008. The entire sample consisting of all the closing prices has a total of 3,216 trading days. The open, high, low, close and volume are recorded. The main characteristic in time series that traders are interested in is volatility or huge returns which are found in the heavy tails of the returns' distribution. Therefore, this research will first chart the returns' distribution. The prime interest in conducting a descriptive data statistics on the futures returns is to find statistics on its mean, standard deviation, skewness and especially its kurtosis. The purpose of analysing the returns is to find if the return's distribution exhibits leptokurtosis. If the return's distribution exhibits excess kurtosis from the normal distribution, then it

cannot be inferred that the returns are random.

The distribution of FKLI daily price changes is non-normal for the period of 15/12/1995 to 31/12/2008 with mean of -0.03, standard deviation of 13.97, skewness of -0.0024 and kurtosis of 14.97. The kurtosis of 14.97 for FKLI return exhibits excess kurtosis from the normal distribution of 3, therefore, it cannot be inferred that the returns are random. The daily FKLI returns are depicted in Figure 1. It shows heavy and long tails which imply that large changes occur more frequently than in a normal distribution.

For FCPO, the data collected is the closing prices from 2nd January 2002 to 31st December 2008. The data statistics on FCPO's returns is tabled in Table 2 and the distribution of FCPO's return is depicted in Figure 2.

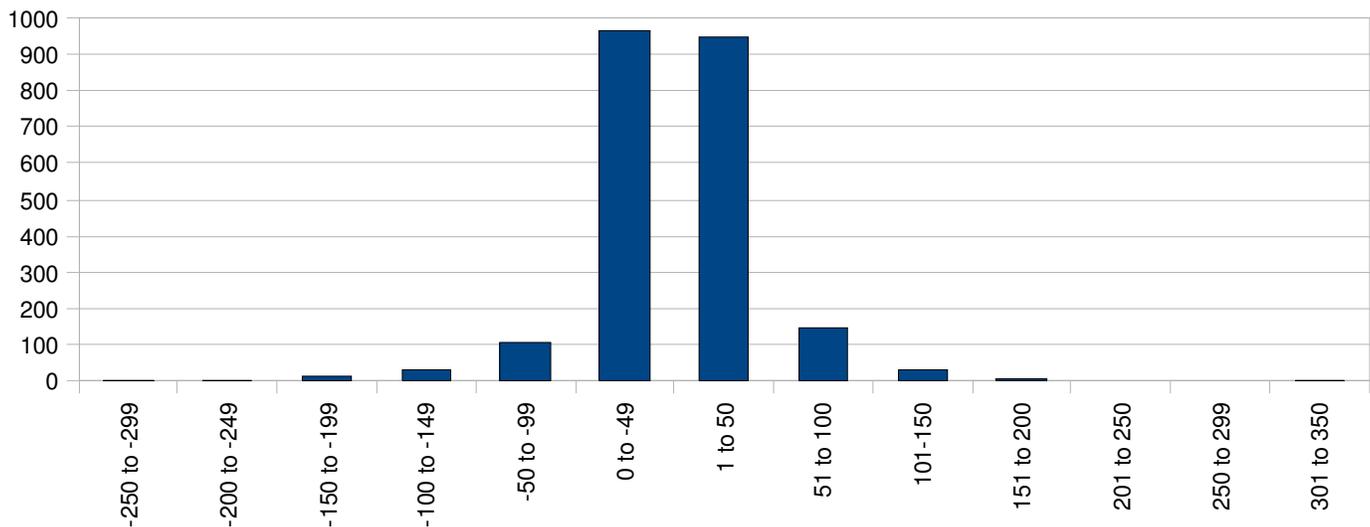
The distribution of FCPO daily price changes is non-normal for the period of 2/1/2002 to 31/12/2008 with mean of 1.04, standard deviation of 41.42, skewness of -0.31 and kurtosis of 6.73. The kurtosis of 6.73 for FCPO return exhibits excess kurtosis from the normal distribution of 3,

Table 1. Daily FKLI returns distribution from 15/12/1995 to 31/12/2008.

Contract	Mean	Standard deviation	Skewness	Kurtosis
FKLI	-0.03	13.97	'-0.0024	14.97

Table 2. Daily FCPO Returns Distribution from 2/1/1995 to 31/12/2008.

Contract	Mean	Standard deviation	Skewness	Kurtosis
FCPO	1.04	41.42	'-0.31	6.73

**Figure 2.** Daily FCPO returns distribution from 2/1/2002 to 31/12/2008.

therefore, it cannot be inferred that the returns are random. FCPO daily returns also show long tails.

METHODS

This research proposes to use the area between around one standard deviation bands to define range and any price above or below around one standard deviation bands to define potential uptrend or downtrend respectively. Note that in Figures 3 and 4, the large uptrends seem to begin after prices rise above the upper +1 standard deviation band and the downtrends seem to begin after prices fall below the lower -1 standard deviation band. When prices are moving out of the trading range, then trend trading technique will apply. The trend trading technique is to buy after it breaks out of resistance area in an uptrend and to sell after it breaks down of support area in a downtrend.

To avoid some of the whipsaws, we propose to use long term moving average and its relatively larger standard deviation in a ranging market. When market is ranging, long term moving average is used because it takes the average and view of the longer term and thus avoid some short term whipsaws. Using long term standard deviation from this moving average also generally gives a larger area between the bands. This also helps to prevent some unnecessary whipsaws.

To capture a new trend early, short term moving average and its

relatively smaller standard deviation in a trending market are more suitable. When market starts to trend, a short term moving average is used because it allows earlier entry into a new trend. Using short term standard deviation from this moving average generally gives a narrower area between the bands. This also helps to ensure an earlier entry into the new trend.

To adjust the length of the moving average and standard deviation, a long term parameter is used in range market and a short term parameter is used in trend market. Efficacy Ratio is a new technical indicator created for this research.

$$\text{Efficacy ratio} = \frac{\text{Long term standard deviation}}{\text{Short term standard deviation}} \quad (1)$$

When market is ranging, Efficacy Ratio is a larger parameter. This larger Efficacy Ratio is used to determine the longer moving average length and generally wider standard deviation bands (a longer moving average length and wider standard deviations will result in less whipsaws in range trading), whereas during trending market, Efficacy Ratio is a smaller parameter. This smaller Efficacy Ratio is used to determine the shorter moving average length and generally narrower standard deviation bands (a shorter moving average length and narrower standard deviations will result in early entry into a new trend at a more favourable price). Therefore, the length of the moving average and standard deviations will automatically



Figure 3. Chart of FKLI, 21 moving average, +1 standard deviation upper band and -1 standard deviation lower band.

adjust, adapting to the Efficacy Ratio. This adaptability potentially addresses one of the common problems encountered by traders in gauging whether the market is ranging or beginning to trend.

ABZ' trades only outside the 0.8 standard deviation bands. 0.8 is arbitrarily chosen because in the optimisation tests for BBZ, 0.8 is deemed to be the most optimal parameter for the bands. This study ascertains that a trend begins when the price is above 0.8 (or below -0.8) standard deviation from the moving average. As ABZ' is a mechanical trading system, a set of trading rules can be programmed for it. The set of trading rules on when to buy and when to sell are presented in Table 3.

The purpose of running empirical tests on mechanical technical trading systems is to ascertain that:

- i. Prices are not random.
- ii. Mechanical technical trading systems can capture abnormal returns in excess of the passive buy-and-hold policy.

iii. ABZ' generates more returns than the moving averages systems tested, for FKLI, FCPO, Soyoil and Corn Futures for results greater than the passive buy-and-hold policy.

For comparison purpose, this research also includes testing of other technical trading rules specified by Brock et al. (1992) as well as other popular technical trading rules. Brock et al. (1992) test 12 technical trading rules and this research attempts to do the same. The technical trading rules specified by Brock et al. (1992) include Variable-Length-Moving-Average technical rules, Fixed-Length-Moving-Average rules and 6 Trading-Range-Break rules. Besides moving averages and breakout of range trading rules specified by Brock et al. (1992), other popularly tested technical trading rules in literature review like stochastics, Alexander's Filter Rules, MACD are also tested. However, some popular trading systems frequently quoted by retail investors and newspapers, like RSI, are tested but not reported because the results are negative. The 12

common trading systems selected then are:

1. Simple 21 Days Moving Average (MA)
2. 3 and 21 Days Moving Average Crossover (MAC)
3. Kaufman Adaptive Moving Average (KAMA)
4. Bollinger Bands Z-T-Statistics (BBZ)
5. Optimised BBZ (Opt BBZ)
6. Adjustable Bands Z-Tests Statistics (ABZ')
7. Moving Average Envelopes of 1% (MAE)
8. Trading Rule Breakout
9. Alexander's Filter Rules
10. Moving Average Convergence Divergence (MACD)
11. Stochastics
12. Chande Market Oscillator (CMO)

The most common mechanical trend trading system is the simple moving average which Brock et al. (1992) refers to as Variable Moving Average (1,21,0%). 1 refers to the closing price, 21 refers to 21 periods moving average and 0%



Figure 4. Chart of FCPO, 21 moving average, +1 standard deviation upper band and -1 standard deviation lower band.

Table 3. ABZ' Set of trading rules.

1.	Buy (enter long)	when prices are more than around 0.8 standard deviation ($P > \text{Upper Band}$)
2.	Sell (exit long)	when prices are less than around 0.8 standard deviation ($P < \text{Upper Band}$)
3.	Sell (enter short)	when prices are less than around -0.8 standard deviation ($P < \text{Lower Band}$)
4.	Buy (exit short)	when prices are more than around -0.8 standard deviation ($P > \text{Lower Band}$)

refers to 0% from the simple moving average. The method to construct this simple moving average trading system is to calculate the average of 21 daily closes and compare that to the current close. If the current close is above the 21 day moving average, then the signal is to buy. If the current close is below the 21 day moving average, then the signal is to sell. Another common mechanical trend trading system is the moving averages crossover which Brock et

al. (1992) refers to as Variable Moving Average (3,21,0%). 3 refers to the 3 periods moving average, 21 refers to 21 periods moving average and 0% refers to 0% from the averages. The method to construct this moving averages crossover trading system is to calculate the average of 3 daily closes and the average of 21 daily closes. If the 3 day moving average is above the longer 21 day moving average, then the signal is to buy. If the 3 day moving average

is below the 21 day moving average, then the signal is to sell. Both the previous moving average(s) systems are fixed length moving average(s) and the lengths, 3 and 21 are arbitrary chosen.

In order to vary these moving averages according to market conditions, Kaufman (1998) proposes to apportion weights to the current data, and past smoothed data series according to Efficiency ratio, the formula is:

Table 4. Instructions using system tester for BBZ (21,1).

1)	Under System Tester, key in the name BBZ.
2)	(Program “Enter Buy” to be: “Close>BbandTop(Close, 21, Simple, 1) (Program “Exit Buy” to be: “Close<BbandTop(Close, 21, Simple,1) (Program “Enter Sell” to be: “Close<BbandBot(Close,21,Simple,1) (Program “Exit Sell” to be: “Close>BbandBot(Close,21,Simple,1)
3)	Run “Simulation Tests” on the data.
4)	View “Results” after the test to check for
a)	amount of profit,
b)	no of trades, profit versus unprofitable trades,
c)	average gain versus average loss per trade,
d)	maximum consecutive gains versus maximum consecutive losses.

Table 5. Instructions using system tester for optimised BBZ.

1)	Under System Tester, key in the name Opt BBZ.
2)	(Program “Enter Buy” to be: “Close>BbandTop(Close, Opt1, Simple, Opt2) (Program “Exit Buy” to be: “Close<BbandTop(Close, Opt1, Simple,Opt2) (Program “Enter Sell” to be: “Close<BbandBot(Close,Opt1,Simple,Opt2) (Program “Exit Sell” to be: “Close>BbandBot(Close,Opt1,Simple,Opt2)
3)	Run “Simulation Tests” on the data.
4)	View “Results” after the test to check for
a)	amount of profit,
b)	no of trades, profit versus unprofitable trades,
c)	average gain versus average loss per trade,
d)	maximum consecutive gains versus maximum consecutive losses.

$KAMAt = a ER Ct + (1-a ER) KAMAt-1$ where $a = [(ER \times (2/3 - 2/31)) + 2/31]^2$ and $ER = (Ct - Ct-n) / \text{Absolute Sum of } (Ct - Ct-1)$

Ct is the most current close and Ct-1 is the previous close. KAMA uses Efficiency ratio to determine the weight of the current data and past smoothed data series whereas ABZ adjusts the length of the moving average for each different period according to the prevailing Efficacy ratio.

However, these systems are turn and reverse systems, which mean that the trader trades all the time, even in range periods when the trader gets a lot of whipsaws.

To avoid trading unprofitably during range periods, part of this study proposes BBZ, (Chan and Azizan (2010) to trade when volatility increases, when the price moves above +1 or below -1 standard deviation band. The method to construct BBZ is to calculate the 21 day moving average and 1 standard deviation. The next step is to add 1 standard deviation to the 21 day moving average to get the upper band and to deduct 1 standard deviation from the 21 day moving average to get the lower band. If the close is above the upper band, then the signal is to buy and when the close is below the upper band, the signal is to exit long. If the close is below the lower band, then the signal is to sell and when the close is above the lower band, the signal is to exit short.

However, fixed length BBZ (21,1) produces result that only favours trends that begin when prices move beyond the 1 standard deviation bands from the 21 period simple moving average. For other periods, when market is moving very fast and not moving at all, 21 period and 1 standard deviation may not be the most optimal parameters to use. Therefore optimisation is done to find the

optimised parameters that produce the best results. Optimisation is a series of simulations with different parameters with the intention of selecting the most optimal parameters that generate the most profit with the least number of consecutive losses. The system tester then generates the most optimized moving average and optimized standard deviation. In system tester, steps 1 to 4 are repeated, replacing 21 with “Opt1” and 1 with “Opt2”.

The most optimized parameters for FKL1 and FCPO are 34 day moving average and 0.8 standard deviation bands from the moving average.

However, optimisation can only be performed on past data, after the event. Before the event, it is necessary to predict the optimal moving average and standard deviation to use. So from the range of results from optimized BBZ, ABZ' is designed to variate to the optimal moving average and 0.8 standard deviation from parameters around $\sqrt{34}$ to 34 according to market conditions. If the market is ranging, that is Efficacy Ratio is large, then a long term moving average and standard deviation are used. This is to prevent some unnecessary whipsaws that are characteristics of short term moving average. If the market is starting to trend, that is Efficacy Ratio is small, then a shorter term moving average and standard deviation are used. This is to permit earlier entry into the new trend at more favourable price. $ABZ' = MA' + Stdev'$ where MA' and Stdev' are the moving average and standard deviation according to the prevailing Efficacy Ratio.

Moving Average Envelope (1.01) is the 1% bands above and below the moving average. The trading technique is to buy long above the upper band, sell short below the lower band and not trade within the bands. A 20 day trading rule breakout is to buy on

Table 6. Test results for trading systems for 2/1/2008-31/12/2008.

Contract	Buy-Hold	MA	MAC	KAMA	BBZ	Opt BBZ	ABZ'	MAE 1.01	Trading rule breakout	Alexander filter rule	MACD	Stochastics	CMO
FKLI	-562	433.5	378	498.5	213.5	366	316	246.5	288	327	278.5	406	165
FCPO	-1387	820	948	-456	672	1119	690	444	6	1466	-874	592	-150
Soyoil futures	-16.49	19.69	29.22	29.64	14.41	27	30.6	21.21	-4.89	10.68	-4.14	24.82	3.6
Corn futures	-49.2	134.6	52.8	-31.6	121	328	230	209	206.2	55.2	276.4	68.2	132.4
Wheat futures	-289	216.8	283.2	-194.6	-159.8	327	484	251	-175.8	399	-124	-264.4	-534.8

breakup above the last 20 days trading range and to sell on breakdown below the last 20 days trading range. If the market price is higher than any other prices in the last 20 days, the signal is to buy. If the market price is lower than any other prices in the last 20 days, the signal is to sell. Alexander Filter Rule of 3% is to buy when the close is 3% above the lowest low within the last 20 days and to sell when the close is 3% below the highest high within the last 20 days.

Exponential moving averages are used to construct momentum oscillator called moving average convergence divergence (MACD) by taking the difference between 12 days Exponential Moving Average (EMA12) and EMA26. The MACD signal line can be constructed in the following way by computing the simple 9 periods moving average for EMA12-EMA26. When the MACD is above the signal line, then the trading technique is to buy. When the MACD line is below the signal line, then the trading technique is to sell.

Stochastic is a leading indicator that compares the difference between the current close to the low in a given period to the absolute price range in this given period. This is called %K.

$$\%K = 100 \times (C - L) / (H - L)$$

where C = current close, H = high in N period and L = low in N period; %D takes the average of %K (Default is 3 days):

$$\%D = \frac{\sum (3 \text{ period } \%K)}{3}$$

Any stochastic value below 20 is considered oversold and the trading technique is to look for a place and also other

confirmation signals to buy. Any stochastic value above 80 is considered overbought and the trading technique is to look for a place and other confirmation signals to sell. Chande Market Oscillator (CMO) is a leading momentum indicator that uses the difference of the up days and down days over the sum of both up and down days as follows:

$$\text{CMO } t = \frac{S_u - S_d}{S_u + S_d} \times 100$$

Where S_u is the sum of the difference between today's close and yesterday's close on up days; and S_d is the absolute value of the sum of the difference between today's close and yesterday's close on down days. Anything over 50 is considered overbought and below 50, oversold.

RESULTS AND DISCUSSIONS

The results confirm the hypotheses. The histogram of daily price changes shows that the distribution for the entire sample from 2nd January 2002 to 31st December 2008 has fat tails denoting large changes that happen more frequently than in a normal distribution. In these simulations, the empirical results show that the mechanical algorithm trading systems generate the abnormal returns that are above the benchmark buy-and-hold policy for all contracts tested. The results are summarized in Table 6.

In Table 6, all trading systems are better than

buy-and-hold policy for 2008. In 2008, all the trading rules report profits for most of the contracts except for Stochastics and CMO. Stochastics is a leading technical indicator. The best 4 are simple moving average, moving average crossover, optimised BBZ and ABZ'. The limitations of back-testing are that test results cannot account for intra-day movements which give earlier entry signals which may result in more profits or more losses and any slippage (which is usually not a factor to be concerned with in liquid markets).

For the period 2/1/2008 to 31/12/2008, ABZ' shows profit of 316 index points for FKLI compared to the buy-and-hold policy which yield a negative return of -562 index points and 690 for FCPO compared to a negative return of -1,387 points. For other comparison purpose, the risk free rate, the rate of return of a 10 year Malaysian Government Securities at the closing of 30 June 2008 is 4.770%. The chart for ABZ' from 2/1/2008 to 31/12/2008 for FKLI is in Figure 5 and for FCPO is in Figure 6.

Conclusion

To sum up, the most important feature of an algorithm trading system is its ability to adapt quickly and be robust in different markets and across different time frames. In designing the new algorithm trading system, the technical indicator used

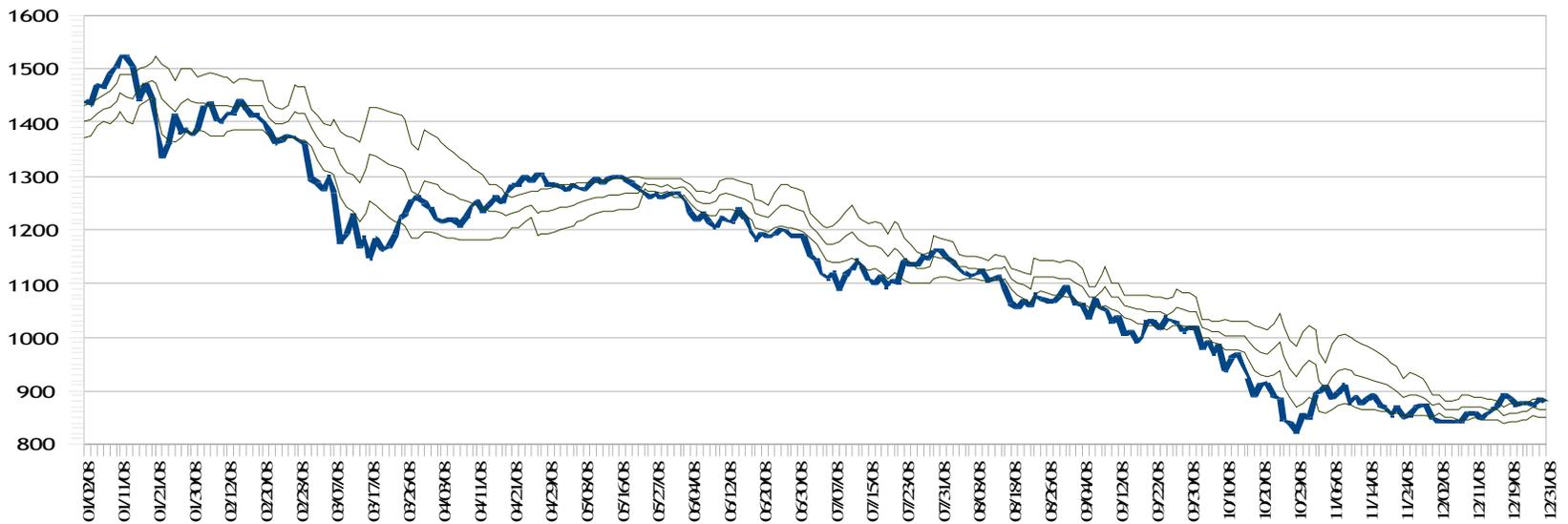


Figure 5. Adjustable bands Z-test-statistics' on FKL1 for 2/1/2008-31/12/2008.

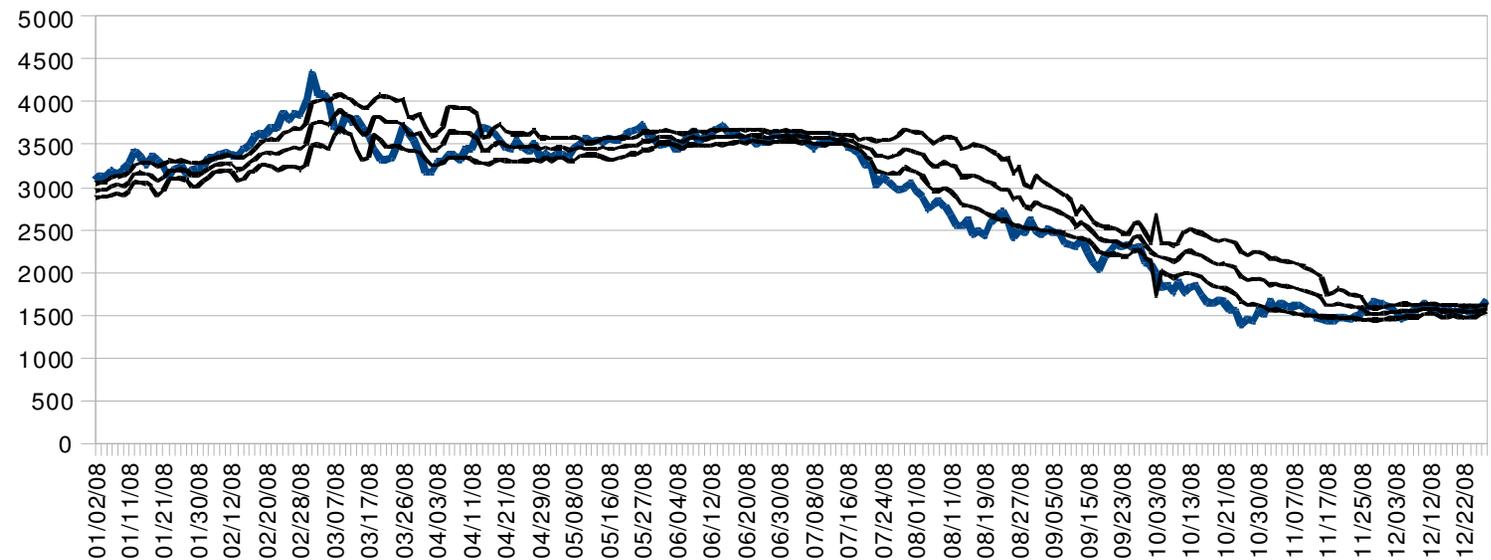


Figure 6. Adjustable bands Z-test-statistics' on FCPO for 2/1/2008-31/12/2008.

should show this ability. Conceptually, Efficacy Ratio, the product of this research, is designed to adjust to both the different market conditions, range market and trend market.

ABZ' is designed to address some of the common problems encountered by most trend trading systems like being triggered by floods of orders generated by common trading systems (like simple moving average), being whipsawed in range market and inability to capture the trend by entering the trend too late and exiting the trend too early. In selecting the most ideal algorithm trading system, factors to take into consideration are that the trading system should not encounter large losses, or show net large loss in any of the years. The algorithm trading system should work well in practice as in testing and that it can adjust automatically to the parameter shifts. Of course, in testing, slippage should be taken into consideration.

In summary, this paper demonstrates that: the prices of FKLI, FCPO and other futures contracts tested are not random; mechanical algorithm trading systems like moving averages; BBZ and ABZ' can be used to capture the abnormal returns arising from trending behaviour; ABZ' and Efficacy Ratio can be used to adjust the moving average and standard deviation to suit either ranging or trending market condition.

This conclusion supports Mandelbrot and Hudson (2004)'s claims that price changes are not random but move in trends. This research finds the newly innovated adaptive algorithm trading system, ABZ', a very useful technical analysis tool that adjusts automatically to the different market conditions. ABZ' employs Efficacy Ratio, a new technical term devised in this research to determine the variable length of standard deviation to gain earlier entry into a new trend and avoid whipsaws in range. ABZ' is a robust systems as it generates abnormal returns above the buy-and-hold policy across FKLI, FCPO, Soyoil Futures, Corn Futures and Wheat Futures. The possible implications from this work are that large bonuses need not be given out to outperforming traders to the detriment of a nation, nor large trading losses of financial institutions be part of tomorrow's financial news. The main product of this research is ABZ' which can be applied immediately on any professional model trading desk.

However, it should be noted that there is still much to be done for future further research to find specific algorithms to automatically determine the length of the long and short term standard deviations, the preset width of the bands from the moving average and the maximum parameter for the bands.

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Full Length Research Paper

The economic and logistic benefits of online business registration for Congolese immigrants in Cape Town

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Computer has revolutionised the ways businesses are conducted across the globe and brought about the business to business (B2B) e-commerce revolution, which accelerated the process of globalisation. B2B e-commerce has been adopted in the Europe (EU), United States of America (USA), India, New Zealand and South Africa (SA) to enhance business registration and promotions. However, this development is not yet applicable in Congo-Brazzaville. However, owing to the nature of Congolese immigrants' small micro and medium-sized enterprises (SMMEs) in Cape Town, online business registration is necessary to enable them to save in respect of supply chain management costs and contributions to the country's economic reconstruction process. Hence, the Centre for Business and Administrative Procedures (CFBAP): Centre des Formalités Administratives des Entreprises (CFE), should consider the B2B e-commerce website as an important objective. At a national level, e-commerce website adoption at CFBAP will leverage the country's standards of conducting business, as well as stimulate Congolese immigrant entrepreneurs in Cape Town to invest in Congo-Brazzaville.

Key words: E-commerce, centre des formalités administratives des entreprises (CFE), Congo-Brazzaville, World Bank, small micro and medium-sized enterprises (SMMEs), immigrants, centre for business and administrative procedures (CFBAP).

INTRODUCTION

Congo-Brazzaville is ranked 144th out of 177 countries (World Bank, 2008) in terms of conducting business and living standards. The country's economy focuses on crude oil exploration, forestry and minerals rather than creating conditions that are capable of attracting,

strengthening and sustaining Small Micro and Medium-sized Enterprises (SMMEs) (Forum des Jeunes Entreprises du Congo, 2010). However, not all sectors of the Congo-Brazzaville economy are affected equally by technological developments. Telecommunication, electronics, education, health, army, business, police and home affairs are much more affected than the textile, forestry and metals industries. Until recently, the only way to have a business registered in Congo-Brazzaville is to travel to Brazzaville, and confront bureaucratic procedures at the Centre for Business and Administrative Procedures (CFBAP): Centre des Formalités Administratives des Entreprises (CFE), which was created in 1994 to commit to the promise of economic reform (Forum des Jeunes Entreprises, 2009). Although CFBAP has offered all types of Decision Support Systems (DSS) in the genesis of business registration (Ukpere, 2010:467), excluding Internet and e-commerce technologies, it is not enough to conclude that CFBAP has fulfilled its mission statement, which is "to ease the process of business registration"

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Abbreviations: B2B, Business to business; CFBAP, centre for business and administrative procedures; CFE, centre des formalités administratives des entreprises; SMMEs, small micro and medium-sized enterprises; DSS, decision support systems; DHA, department of home affairs; IA, immigration act; RA, refugee act; ID, identity document; EU, Europe; USA, United States of America; SA, South Africa; ANC, African National Congress; DTI, Department of Trade and Industry; VAT, value added tax; PPC, pay per click; ICT, information communication technology; IT, information technology; GATS, general agreement on trade in services; GDP, gross domestic product.

(Mavoungou, 2008). Moreover, "traditional" business registration, which is not effective for Congolese immigrant entrepreneurs, threatens business expansion in Brazzaville owing to high supply chain management and operating costs. Recently, Internet and e-commerce have enabled today's businesses in developed and some developing countries to save when buying and selling products and services via computer networks (Cassidy, 2002; Durie, 2001). However, business-to-business (B2B) e-commerce, which is fully automated in the EU (Cape, 2006), USA and India (Bharati and Chaudhury, 2006), New Zealand (Al-Qirim and Bathula, 2002) and South Africa (SA), has not yet been adopted at CFBAP in Congo-Brazzaville. This paper is one of the few studies that deal with benefits of online business registration for Congolese immigrant entrepreneurs, which is an important concept in the functional relationship between e-commerce adoption and Congo-Brazzaville's development through SMME support. The current authors postulate that if sufficient attention is not paid to the necessity of implementing an e-commerce website at CFBAP, Congo-Brazzaville immigrants' businesses will not secure long term profits. Therefore, increased supply chain management costs will hinder Congolese immigrants' entrepreneurial ventures, and compromise the country's Gross Domestic Product (GDP).

Factors that motivate Congolese immigrant entrepreneurs to invest in Brazzaville

Despite being attracted to SA, Congo-Brazzaville immigrant entrepreneurs in Cape Town have now realised the need to invest back at home in Congo-Brazzaville owing to certain reasons, namely high crime rate, xenophobic attacks, SA double-edged immigration policy, lack of access to resources, political uncertainty in SA and relative political stability in Congo-Brazzaville.

Crime in SA

In a study, which was released by Thorton in 2008 (SA Survey, 2007/2008), crime, including armed robbery, rape, child abuse, prostitution, pick-pocketing, shop-lifting, car hijacking and hijacking of cash-in-transit vehicles, were the most frequently cited reasons for professional SA citizens immigrating (SA Survey, 2007/2008). According to Ukpere (2009), currently, the SA Correctional Services has complained of congested jails around the country owing to rising levels of crime within the country. Considering that a misfortune never comes singly, and the old saying, which states that an idle mind is a devil's workshop (Ukpere, 2009) less fortunate SAs who are victims of delayed political promises, have vented their anger by physically attacking Black foreigners and looting their belongings. This practice has

been commonly labeled as xenophobia.

Xenophobic attacks in SA

Xenophobic attacks took place in May and June 2008 when Black African immigrants, including Congo-Brazzaville nationals were among 10,000 victims. The State's shortcomings owing to the incompetence of the Department of Home Affairs (DHA), which was affected by corruption and under-funding, urged Congo-Brazzaville immigrants to return home and relocate their businesses. Research shows that, contrary to the idea that unskilled immigrants took away jobs from SAs, they (Black foreign entrepreneurs) usually end up being employers of about three SA citizens or more (SA Survey, 2007/2008). However, instead of promoting foreign Black SMMEs' engagement, the SA government has not only prioritised SAs, but has also adopted a double-gear immigration policy, which is based on the 1998 legislation of the Refugee Act and the 2002 Immigration Act, which appeared ineffective for Black African migrants, including Congo-Brazzaville immigrant entrepreneurs. In addition, inefficiency of the above mentioned SA immigration policies, which failed Black African immigrants could be a way to accomplish Charles Darwin's prophetic message (Ukpere, 2009), which has been opined that: "if the misery of our poor be caused not by the laws of nature, but by our institutions, great is our sin".

Double-edged SA immigration policies

A report, which was released by the Paris-based International Federation for Human Rights, states that SA's migration policy is still like that of the previous governments in respect of the harassment of so-called illegal immigrants (SA Survey, 2007/2008). The report criticised the policy, which criminalised migration and fuelled xenophobia. Government policy remained geared towards security concerns and population control. This approach was based on the premise that considerable numbers of economic migrants wish to enter SA. This focus on populace control is complemented by the enforcement role of the police, which often confuses undocumented migrants and criminals. There are two main pieces of legislation that govern the entry of foreigners into SA, namely: the immigration act (IA) of 2002 and the refugee act (RA) of 1998. The IA deals with people who had come to work, to start a business, or to study, while the RA dealt with people who had fled to SA because of political circumstances in their own countries (SA survey, 2007/2008). Early findings of this paper revealed that foreigners seeking a better life in SA have had difficulty obtaining legal status, even though one-third of them possess education or skills that are much needed in SA. As a result, SA has a number of

foreigners, particularly Black Africans including Congolese who live from hand-to-mouth, with little legal protection and access to resources, which are fully available. These Africans bore the brunt of xenophobic attacks in 2008 and 2010. The principle behind the IA of 2002 was that SAs should take care of their own first, even though it preferred skilled over unskilled migrants, while the RA of 1998 focused more on human rights. Asylum applications were provided with advantages in terms of the RA of 1998, which permitted them to work, access health care and study. However, when it comes to African migrants, including Congo-Brazzaville immigrants to have a decent job even if qualified for the position, the IA of 2002 applies first. In addition, to embarrass the asylum and refugee job applicants, recruiters require them to produce a valid SA green Identity Document (ID), whereas they are issued with brown IDs, which distinguish them from the SAs' green ones. Therefore, even though employers know that asylum and refugee job applicants are allowed to work, they will not select them in spite of evidence of skills and qualifications to do the job (SA Survey, 2007/2008). Therefore, the SA double-edge immigration policy, which made it impossible to access resources in SA, has forced Congolese immigrant entrepreneurs to invest back home in Brazzaville.

Lack of access to resources for immigrants

It is argued that SA's borders were impossible to monitor because of its length and geographical features. In terms of this logic, enforcement of migration law needed to take place at community level, where migrants lived, worked, and studied. Hence, government migration policy focused on rendering SA inhospitable for undocumented migrants through arrests, and restricting access to jobs, services, and temporary residence. Recently, SA's migration policy ignored the fact that a large majority of migrants entered SA legally. Several were cross-boarder traders, seasonal, circular, or temporary migrants who did not wish to settle in the country (SA Survey, 2007/2008). However, unfulfilled promises from SA politicians, which are translated by their incapacities of replacing social tensions by human satisfactions, bequeathed hatred on a daily basis by SAs towards Black foreigners, who are accused of taking away SAs' jobs. Alam and Hoque (2010) also found similar findings to the other context of the world.

Political uncertainty in SA

Concerning the leadership of the country (SA), the power tussle within the African National Congress (ANC) leadership, which almost coincided with the xenophobic attacks during the last election that brought President Jacob Zuma into power, caused a sharp increase in the number of affluent Congo-Brazzaville immigrants looking forward to going back home for good, either before the

2010 Soccer World Cup or soon after.

Relative political stability in Congo-Brazzaville

The last 2009 presidential election in Congo-Brazzaville, which re-elected President Sassou to power, did not raise any concerns, violence or opposition protests. This tendency attracted companies such as Warid Telecom, MTN SA and several others in Brazzaville (Forum des Jeunes Entreprises du Congo, 2010).

BENEFITS OF ONLINE BUSINESS REGISTRATION FOR CONGOLESE IMMIGRANT ENTREPRENEURS

In developed countries, dynamic arguments for the existence of SMMEs have been stressed in terms of their innovative capacities and potentially they merge to create larger firms. In contrast, Congolese immigrant entrepreneurs' SMMEs are increasingly taking the role of the primary vehicles for the creation of employment and income generation through self-employment, and, therefore, are among tools, which enable poverty alleviation in SA. In addition, Congolese SMMEs in Cape Town operate in the sectors of retail and services. However, owing to their characteristics, which include the size of capital investment, number of employees, turnover, management style, market share and various hindrances owing to immigration policies, Congolese immigrant entrepreneurs agree that business expansion in Brazzaville, which creates domestic linkages with other SMMEs in Congo-Brazzaville in terms of diversification strategies, becomes imperative for business survival (United Nations Conference on Trade and Development, 2001). From the above, the current authors have noted that business expansion through e-commerce technologies will enable Congolese immigrants' SMMEs to save in terms of supply chain management costs. Therefore, the rapidly accelerating rate of technological innovation has forced Congolese immigrant entrepreneurs to demand a business-to-business (B2B) e-commerce website at CFBAP, which should enable online business service. B2B e-commerce, which is fully automated in SA, is still not applied in Congo-Brazzaville. In SA, businesses rely on computer technology in almost every area of the corporate life cycle (Pillai, 2010:3). Reliance on high-speed digital computers is so complete that SA commerce would cease if computers were removed from business cycles (Importance of computers from 1946 to date, 2010:2). As a result, technologies were introduced at the SA Department of Trade and Industry (DTI), enabling business people to register businesses online. According to Vogt et al. (2003), e-commerce can reduce transaction-level costs, improve time-scale and reduce errors. The authors further argue that e-commerce will redesign CFBAP's interface and that of its partners.

Sources of delay in offline business registration processes at CFBAP would be corrected, while redundancy and unnecessary delays would be improved (Vogt et al., 2003). Congolese immigrants' perceived online business registration benefits include areas of finance, management, marketing, and logistics as well as in the Congo-Brazzaville economy. Finance has been identified as the most important factor, which determines the survival, growth and expansion of Congolese immigrants' businesses established in Cape Town. The first role of e-commerce to Congolese immigrant entrepreneurs in finance would be to increase speed of financial operations between Congo-Brazzaville and SA. Thus, increased speed of financial operations would enable Congolese immigrant entrepreneurs to expand their business activities in Congo-Brazzaville, which would contribute to job creation, poverty alleviation and the country's economic growth (United Nations Conference on Trade and Development, 2001; Lipsky, 2007). Online Value Added Tax (VAT) declaration is another benefit of e-commerce for Congolese immigrant entrepreneurs. As with the paper version, the electronic VAT declaration form would be completed by the CFBAP Corporate Tax Division before being sent out. Therefore, the VAT, which is due would be automatically calculated and tax payers would be notified by CFBAP through email at any time that their VAT is due in order to avoid penalties owing to late VAT declarations (Clear Books, 2010).

In addition, Congolese immigrants' businesses would increase profits through the potential CFBAP e-commerce website by using various technologies, namely Website page landing, Google Pay Per Click (PPC) and banner. A Website page landing can be any Congolese immigrant entrepreneur's website page, which is specifically sent to online traffic to the potential CFBAP's e-commerce with the aim of increasing sales (E-commerce Juice, 2010). In addition, PPC is like an auction, which targets specific keywords and key phrases, hence Congolese immigrants' businesses would get immediate global exposure (E-commerce Juice, 2010). According to Ahmed (2010), online banner ads would yield two benefits for Congolese immigrants' businesses. First, they will entice users to click on the banner and go to the advertiser's site. Secondly, online ad banners will enable Congolese immigrants' businesses to build brand recognition (Ahmed, 2010; Maksimovic, 2010).

Due to the fact that a majority of Congolese immigrant entrepreneurs' SMMEs face challenges related to poor resources at different levels, including finance and management, to overcome these managerial challenges with the aid of Internet and its use for commercial purpose, a Congolese CFBAP e-commerce website has become necessary.

Managerial benefits of online business registration at the CFBAP potential website will include strengthening business relationships in Congo-Brazzaville SMMEs. Considering that individual SMMEs in Congo-Brazzaville

generate relatively small revenues, strengthening business relationships through e-commerce among Congo-Brazzaville SMMEs will enable them to submit online data to the Congolese Statistical Office in order to keep management fees low (United Nations Conference on Trade and Development, 2001). In addition, SMMEs in Congo-Brazzaville suffer from management constraints that lower their resilience to risk and prevent them from growing and attaining economies of scale. E-commerce adoption at CFBAP will enable Congolese immigrant entrepreneurs to overcome management constraints, which are related to customs declaration at ports in Brazzaville and Pointe-Noire for imported items, and a huge bureaucratic process involving business environmental related permit applications. Moreover, financial and accounting records within some Congolese SMMEs are rarely in place, and where they are available, their accuracy is usually doubted. In instances where a bank loan is provided, it is in most cases granted to the most organised and profitable SMMEs. Considering that in Congo-Brazzaville, SMMEs' bank loans are of a short duration, owing to inflation rates and SMMEs characteristics, it may be difficult for borrowers to secure collaterals and realise high returns for finance repayments. Therefore, an integrated e-commerce system adoption will enable Congolese SMMEs to organise accounting systems, qualify for bank loans, make profits and retain brain.

Furthermore, some SMMEs in Congo-Brazzaville employ less than five people, mostly family members, who are not legally registered with the Onemo: the Congo-Brazzaville Labour Department. Not surprisingly, such SMMEs in Congo-Brazzaville apply simple and relatively backward technology in production and, therefore, the quality of their products is likely to be poor. Such SMMEs suffer from limited market access and fierce competition from several local producers. In addition, there is a general lack of professionalism and proper training among workers within this category of SMMEs. Thus, B2B e-commerce adoption at CFBAP will empower Congolese entrepreneurs' mindsets through e-commerce's Life Long Learning (LLL) with strategic thinking skills, DSS, business planning, and management skills, in general (United Nations Conference on Trade and Development, 2001).

Although shipping costs can increase the cost of many products that Congolese immigrants may purchase via e-commerce and add substantially to the final price, distribution costs will be significantly reduced for some Congolese immigrants' products and services, namely financial services, business registration, software, and travel, which are important segments of brick-and-mortar commerce in Congo-Brazzaville (OECD, 1999). Congolese immigrant entrepreneurs' marketing efforts should integrate the ideas of having the right product, at the right price, combined with the right promotion, and the availability of that product in the right place in order to

satisfy customers. These are the four Ps of the marketing mix, which should be combined with e-commerce to create place and form utilities for different market segments in Congo-Brazzaville, which Congolese immigrants' businesses intend to supply with products and services that are based on e-marketing and e-logistics strategies.

B2B e-commerce will play various roles in marketing for Congolese immigrant entrepreneurs. Indeed, e-commerce will reduce the internal costs of many transactions for Congolese entrepreneurs and change the cost structure that dictates Congolese immigrants' business relationships with other businesses (Seddon, 1997; OECD, 1999). Another benefit of e-commerce in marketing for Congolese immigrants is disintermediation. According to Seddon (1997), intermediaries who help producers sell to consumers comprise of two types: distributors such as wholesalers and retailers collectively referred to as margins, which are located between the producer of tangible goods and the Congolese consumer; and services, which act as intermediaries for other services (OECD, 1999). From the above, the authors imply that B2B e-commerce adoption in Congo-Brazzaville will directly link producers and consumers, therefore, eliminate intermediaries' costs and improve customer care service.

However, customer care improvement will be another benefit of B2B e-commerce adoption for Congolese immigrants' businesses in Congo-Brazzaville. In today's Knowledge Based Economy (KBE), which is dominated by sophisticated products and services, after-sales services pose a major cost for many Congolese SMMEs. Traditionally, Congolese SMMEs place service personnel in the field to visit clients and get feedback about products and services performance. Through e-commerce, Congolese immigrants' businesses will be able to move much of the customer care online. This shift will significantly cut customer care costs and improve the quality of products, which are offered by Congolese immigrants' SMMEs (OECD, 1999). However, beside the fact that e-commerce is effective at reducing the costs of attracting new customers, advertising is typically cheaper than any other form of media. Therefore, Congolese immigrants' businesses will enhance their visibility and global exposure to different market segments that they intend to supply. Logistics plays a critical role, particularly in support of getting the product in the right place in order to create place, time and possession utilities (Stock et al., 2001) and satisfy the customers. From the above, the authors imply that B2B e-commerce adoption in Congo-Brazzaville will enable Congolese SMMEs to save in terms of inventory costs. According to McDaniel and Terblanche (2004), in order to save on inventory costs, Congolese immigrants' SMMEs should maintain that the faster an item can be ordered and delivered, the less the need for a large inventory of that particular item. In addition, the more market segments Congolese immigrant

businesses tries to serve, the higher the inventory costs are likely to be. Therefore, B2B e-commerce utilisation in Congo-Brazzaville will significantly improve functional relationships between inbound and outbound logistics and enable Congo-Brazzaville SMMEs to save in supply chain management costs (OECD, 1999: 63).

Furthermore, a survey conducted by Šumak et al. (2009) concerning the role of e-commerce in the economy of various countries indicates that compared to "traditional" commerce, e-commerce raises some expectations at a national level, including increased productivity, reduced costs for producers and consumers and increased accessibility. Until recently, to register a new business in Congo-Brazzaville, applicants used the DSS such as word-of-mouth, calculators, spreadsheets, post office facilities and the Yellow Pages. Lack of an e-commerce website at the CFBAP creates large gaps between Congolese immigrant entrepreneurs and CFBAP Brazzaville (Bharati et al., 2006).

According to Šumak et al. (2009), e-commerce adoption in Congo-Brazzaville will have various positive impacts for the economy, which include marketplace transformation and increased economic interactivity. Furthermore, e-commerce adoption in Congo-Brazzaville will enable Information Communication Technology (ICT) to play a catalytic role, create openness of technology and alter time importance in the country's economy for a sustainable development (OECD, 1999).

Research conducted by OECD (1999) concerning the economic and social impact of e-commerce in Europe revealed that e-commerce will change the way businesses are conducted in the world, including Brazzaville and Pointe-Noire, which represent Congo-Brazzaville's major business cities. Traditionally, 80% of businesses in Congo-Brazzaville are established in these two cities, which are close and located in the south of the country (Forum des Jeunes Entreprises, 2010). However, the adoption of e-commerce will replace traditional distribution channels, which will create new products and market development in order to connect Congo-Brazzaville cities and the rest of the world. In addition, e-commerce adoption in Congo-Brazzaville will play a catalytic role in accelerating few changes that are pending such as the establishment of electronic links between Congo-Brazzaville SMMEs, the globalisation of the Congo-Brazzaville economy, and brain retain for higher-skilled workers. Therefore, e-commerce adoption in Congo-Brazzaville will increase interactivity in the economy (OECD, 1999). From the above, people in Congo-Brazzaville will increasingly have the ability to communicate and register business anywhere, anytime. This will have a profound impact, not the least of which will be the erosion of economic and geographic boundaries. Moreover, the economic power that will stem from joining a large e-commerce network will help to ensure that new business standards remain open in Congo-Brazzaville. More importantly, openness will emerge as

a business strategy, with many of the most successful e-commerce ventures granting business partners and consumers in Congo-Brazzaville unparalleled access to their inner workings, databases, and personnel. This will lead to a shift in the role of Congo-Brazzaville consumers who will be increasingly implicated as partners in product design and creation. Therefore, e-commerce will minimize the effects of time as a constraint in production; accelerate production cycles, allow Congo-Brazzaville firms to operate in close co-ordination; and enable Congo-Brazzaville consumers to conduct transactions around the clock. Considering that e-commerce will mitigate the role of business hours in Congo-Brazzaville, so will the structure of business and social activities, causing potentially large impacts on the economy of the country. However, Machiavelli (Stair, 1986) foresees the challenges related to e-commerce adoption in Congo-Brazzaville owing to its newness and stated that, "there is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than the creation of a new system". From the above and owing to the country's Millennium Development Goals (MDGs) policy, it has been noted that Congo-Brazzaville policymakers would not invest in e-commerce systems, which would be utilised by too few people. Therefore, Congolese immigrant entrepreneurs will have to contain e-commerce related challenges, which are discussed in great detail in the following sections in order to secure online business registration in Congo-Brazzaville through e-commerce infrastructure that is being claimed.

However, in order to secure online business registration in Congo-Brazzaville through e-commerce infrastructure, Congolese immigrant entrepreneurs should contain e-commerce related challenges: culture (Javalgi, 2004), Information Technology (IT) infrastructure (Furnell, et al., 2008; Cap, 2006), security and privacy (Liebermann and Stashevsky, 2002; Cap, 2006; Furnell et al., 2008), illiteracy, organisation (Bester, 2006; Remenyi and Sherwood-Smith, 1999), fraud (Byers et al., 2004; Pathak, 2004; Kuchinskas, 2005) and public policy (Javalgi, 2004) because CFBAAP policymakers will not invest 100% in an e-commerce website that might be used by too few people.

RESEARCH METHODOLOGY

Sample and research process

To the best of the authors' knowledge, this paper, which deals with benefits of online business registration for Congolese immigrants, is the first of its kind in SA, and utilised both qualitative and quantitative research methods. For purposes of this paper, a self-administered questionnaire was utilised. The designed questionnaire was divided into two sections, namely a demographic information Section (1); and content-based questions in Section (2). Demographic information comprised of variables such as gender, age, education and dependents, whereas content based questions focused on the benefits of online business registration in Brazzaville

for Congo-Brazzaville immigrant entrepreneurs. The research target population included Congo-Brazzaville immigrant entrepreneurs who live in Cape Town, where the study was conducted. Purposeful sampling method was utilised, where a sample size $N = 116$ of Congo-Brazzaville immigrant entrepreneurs was sought from the general population of the Congolese immigrant entrepreneurs amongst members of the Congolese Association of Cape Town. The survey questions were translated from English into French and French into English by a sworn translator for respondents' better understanding, as French is their first language. A pilot exercise was conducted among five Congolese immigrants namely two workers and three businessmen in Cape Town before distributing the questionnaire to the large population. For respondents' convenience, the researchers were involved in the distribution of 116 questionnaires, and they were given a minimum of two weeks to complete questionnaires before collection. To identify areas of concern for the benefits of online business registration, a focus group comprising of five Congolese immigrant entrepreneurs from Cape Town, who were selected according to their business size, was conducted. Ethical considerations were also taken into cogniSAce when collecting and analysing data. The Congolese Association of Cape Town's members who participated in the survey were guaranteed anonymity, whilst confidentiality of information was also guaranteed.

Distinctive contribution of the paper

The originality of this paper is that it examines how Black African immigrant entrepreneurs can utilise e-commerce to invest back home, which creates an opportunity for further constructive debate.

Data analysis

In order to ascertain what the benefits of online business registration are for Congolese immigrants, the researchers posed certain questions and statements. The researcher also made an earnest effort to find out the reasons that led to Congolese immigrant entrepreneurs to invest in Congo-Brazzaville whilst being well established in Cape Town. The following are responses that were received from the closed-ended questions in the questionnaire.

Business experience of respondents

The rationale of this information was to determine how long Congo-Brazzaville immigrant entrepreneurs have been operating businesses in Cape Town.

Table 1 show that 13.8% of respondents have been operating their business for less than 2 years, while 45.7% have had their business between 3 and 5 years. However, 35.3% of respondents spent between 6 and 8 years in business and finally, 5.2% of respondents have been in business for 12 years or more. With regard to business experience that affects business expansion in Brazzaville, the current authors are of the view that there is clear evidence in the context of online business registration, which provides an edge to Congolese immigrant entrepreneurs. Additionally, experienced entrepreneurs can wax lyrical for business challenges, express words of wisdom and sound extremely know-ledgeable about their businesses compared to less experienced entrepreneurs. The above interpretation leads to a conclusion that there exists a functional relationship between Congolese immigrant entrepreneurs' business experience and business expansion in Brazzaville through CFBAAP's potential website, which is discussed in the following section.

Table 1. Respondents' business experience.

	Years of experience	Frequency	Percent	Valid Percent	Cumulative Percent
	0-2	16	13.8	13.8	13.8
	3-5 years	53	45.7	45.7	59.5
Valid	6-8 years	41	35.3	35.3	94.8
	12 or more	6	5.2	5.2	100.0
	Total	116	100.0	100.0	

(N=116)

Table 2. Respondents' attraction to a potential CFBAP e-commerce website.

	Respondents' opinion	Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly agree	36	31.0	31.0	31.0
	Agree	63	54.3	54.3	85.3
Valid	Disagree	16	13.8	13.8	99.1
	Strongly disagree	1	.9	.9	100.0
	Total	116	100.0	100.0	

(N=116)

Attraction of respondents to a potential CFBAP e-commerce website

The rationale of this information was to determine proportions of Congolese immigrant entrepreneurs who believe that the potential CFBAP e-commerce website will attract them to expand business activities in Brazzaville.

Table 2 reflects that 31.0% of respondents strongly agreed, 54.3% agreed, which totals 85.3% (31.0 plus 54.3%) who believe that a potential CFBAP e-commerce website will attract them to expand business activities in Brazzaville. However, 13.8% disagreed and 0.9% strongly disagreed. Furthermore, the authors are of the opinion that Congolese immigrant entrepreneurs' trust that a CFBAP e-commerce website is an expectation of competent and reliable online service. Therefore, trust in technology results from a primarily cognitive evaluation of performance beliefs, which are acquired from e-commerce experience. Hence, it is proposed that as soon as CFBAP launches its e-commerce website with online company registration service, Congolese immigrant entrepreneurs will be attracted to utilise this online service. Therefore, in accordance with earlier predictions, e-commerce has redefined how consumers learn about, select, purchase, and use products and services in both developed and some developing countries, and changed the nature of legislation, which is analysed in the following section.

Respondents' opinion about Congo-Brazzaville's adoption of e-commerce legislation

The rationale of this information was to determine proportions of Congolese immigrant entrepreneurs who believe that Congo-Brazzaville policymakers should settle e-commerce legislation, which will create trust and traffic in the potential CFBAP e-commerce website.

Table 3 shows that 50.9% of respondents strongly agreed, and 41.4% agreed, which totals 92% (50.9 plus 41.4%) who believe that

Internet legislation should be adopted in Congo-Brazzaville in order to build trust among potential users and hence guarantee online traffic on the potential CFBAP e-commerce website. Most computer specialists whether for fun or profit, have a simple option left for them in the face of nothing, namely Internet crime. However, even though e-commerce legislation could be adopted in Congo-Brazzaville, Congolese immigrant entrepreneurs should contain e-commerce related risks, which are analysed in the following section, before a great harvest of online company registrations yield fruits.

Correlations between online business expansion in Brazzaville and Congo-Brazzaville e-commerce legislation efficiency

The rationale of this information was to determine the relationship between Congolese online business expansion and Congo-Brazzaville e-commerce legislation reliability.

Table 4 reflects that there are opposite correlations of +1 and -1 between Congolese immigrant entrepreneurs' online business expansion in Brazzaville and Congo-Brazzaville e-commerce legislation reliability, which indicates imperfect causation, meaning that both variables do not move in the same direction together. In order to project CFBAP as a tech savvy governmental agency and to enable a point of parity, Congo-Brazzaville's Ministry of Communication should promulgate e-commerce application standard directories in which data integration, information access and data specification in the State agency should be regulated. Furthermore, Congo-Brazzaville's Ministry of Finance and Banque des Etats de l'Afrique Centrale (BEAC): Bank of Central African States should promulgate legal e-commerce texts, which guide businesses to unanimously use IT standards that are applicable in the sectors of card payment, and inter-bank international transfer including e-customs declarations. Finally, Congo-Brazzaville's Ministry of Industry and Trade should establish and promulgate the National technical regulation on Electronic Data Interchange (EDI) for issuing a certificate of origin, which will apply to all national agencies and enable them to issue an electronic certificate of origin

Table 3. Respondents' opinion about Congo-Brazzaville' adoption of e-commerce legislation.

	Respondents' opinion	Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly agree	59	50.9	50.9	50.9
	Agree	48	41.4	41.4	92.2
	Disagree	8	6.9	6.9	99.1
	Strongly disagree	1	.9	.9	100.0
	Total	116	100.0	100.0	

(N=116)

Table 4. Online business expansion in Brazzaville and Congo-Brazzaville e-commerce legislation reliability.

		Business expansion in Brazzaville	Congo-Brazzaville e-commerce legal system reliability
Online business expansion in Brazzaville	Pearson correlation	+1	.150
	Sig. (1-tailed)		.054
	N	116	116
Congo-Brazzaville e-commerce legislation reliability	Pearson correlation	.150	-1
	Sig. (1-tailed)	.054	
	N	116	116

(N = 116)

(eCoSys), while e-commerce transactions will be conducted at all times (Nguyen, 2008:2).

Previous sections analysed and interpreted respondents' business experience, attraction to potential CFBA e-commerce, Congo-Brazzaville's adoption of e-commerce legislation correlation of online business expansion in Congo-Brazzaville and the country's legislation reliability. In response to the mounting necessity of online business registration in Congo-Brazzaville, the following section analyses respondents' focus group meeting, which was held in Cape Town and gathered five top Congo-Brazzaville immigrant entrepreneurs.

What is the Internet?

When discussing this question, the top five (5) Congolese immigrant entrepreneurs agreed that the Internet is a global system that interconnects computer networks. In addition, participants also asserted that computer networks use standard protocols called Transfer Control Protocol/Internet Protocol (TCP/IP). However, the aim of this question was to ascertain participants' basic understanding of the Internet before further scrutiny.

Do you use the Internet for business?

All five participants affirmed that they use the Internet to operate their businesses, which are established in Cape Town. The increased deployments of e-commerce technology in Cape Town, including respondents' education level, were identified as major factors, which enabled them to use the Internet for business. In addition, the rationale of this question was to ensure the corollary of Internet usage for business by Congolese immigrant entrepreneurs, which paved the way for Internet benefits, which are discussed in

the following question.

Which benefits do you gain from using the Internet in business?

During discussions around this question, respondents mentioned various benefits that are gained from the use of the Internet in business in Cape Town. However, respondents postulated that the first benefit of using the Internet in business is to reach people worldwide in a way that even an expensive advertising media would not. Furthermore, respondents mentioned that the Internet enables them to access customers directly and present the information about products or services, which are offered. Recently, a respondent and owner of a security company based in Cape Town reported that "due to a high level of crime in Cape Town, some customers prefer to learn about the capacities of a security company on their own before signing in...", while this information search cost shift enabled one of the respondents to gain more customers (Skipe, 2010). Furthermore, participants mentioned that when customers want to enquire about any given stakeholder, the Internet efficiently provides a list of contacts and phone numbers that enable them to send e-mails directly to a customer service representative, requesting that the said stakeholder should be contacted. Pursuing discussions, participants revealed again that it is easy and inexpensive to define one's business image on the Internet, whether it is a one-person-company or a large corporation. More than that, the Internet enables them to constantly update business details as companies often relocate owing to constant building renovations in Cape Town (Skipe, 2010). Hence, participants stated that the Internet enabled them to process electronic banking and VAT declaration in Cape Town, which eliminates the impact of the middleman. Furthermore, online services present an even brighter option for respondents who operate in the clothing

sector. Through emails, they communicate with parents, guardians and schools to inquire, which school children will need new school uniforms for the following school year. Furthermore, the Internet enables them to handle transactions, automate billing and inventory control in a way that was unparalleled in the past. During this question, participants stated that they have well established the linkage between Internet benefits and business success, which sealed the study's early findings based on theory building and theory testing. Based on the above statements, the authors noticed that Congolese immigrant entrepreneurs, who previously used the Internet for business in Cape Town, are likely to become good users of the potential CFBAP e-commerce website, which created an opportunity for further discussion of the findings.

RESULTS AND DISCUSSION

However, it emerged from Congolese immigrant entrepreneurs' demographic characteristics that the gender gap is wide when it comes to education and entrepreneurial mindsets among Congo-Brazzaville immigrant entrepreneurs. In addition, considering that Congolese immigrant entrepreneurs are digital immigrants, their establishment in Cape Town enabled them to bridge the digital divide. Even though education is positively related to entrepreneurial mindsets, further intellectual discourse postulates that innovation, risk taking and business growth are also relevant characteristics of Congolese immigrant entrepreneurs. Hence, Internet usage among respondents is still directly connected with their education levels, since the higher the education level, the higher the Internet usage rate. Moreover, online company registration is also recognised as a means of economic development in developing countries, which are underserved by traditional company registration systems, including Congo-Brazzaville. This has raised the necessity of linking e-commerce adoption and business experience regardless of e-commerce constraints. However, in spite of being established in SA, Congo-Brazzaville immigrant entrepreneurs have now realised the need to invest back home in Congo-Brazzaville owing to certain reasons, namely the high crime rate, xenophobic attacks, lack of access to resources, political uncertainty in SA and relative political stability in Congo-Brazzaville. Based on the above, the present authors argue that it is not myopic reasoning for Congolese immigrant entrepreneurs who propose that CFBAP should add Internet in the process of business registration because it provides different and important properties. Nevertheless, if CFBAP deploys e-commerce technology in Brazzaville, that technology will be utilised on a 24-h and 7-day basis for Congolese immigrant entrepreneurs, which will improve Congolese SMMEs' supply chain management. Furthermore, respondents confirmed that there are perceived online company registration benefits in the area of finance, management, marketing, strategic logistics management and Congolese national economy, which are positively related to Congolese immigrant entrepreneurs' business profits. In addition, this has raised the necessity that

CFBAP should take a leadership role in e-commerce to revitalize Congo-Brazzaville's economy. Indeed, great business successes that have been achieved in Countries like USA, EU, India and New Zealand that have profitably utilised e-commerce, which gave a powerful credence to the notion that online company registration was the best option to be adopted by both developed and developing nations that seek economic growth. Congolese immigrant entrepreneurs' education level and Internet skills enable them to contain e-commerce challenges, which may arise when utilising the potential CFBAP e-commerce website. Furthermore, considering that the boom of e-commerce, which is based on the General Agreement on Trade in Services (GATS) principles in under-developed countries will include Congo-Brazzaville, Congo-Brazzaville legislators are required to start considering how e-commerce can fit into the multilateral trade framework, and what rules or regulations should apply. At this stage, focus shifted to recommendations and conclusions of the research study.

LIMITATIONS AND FUTURE RESEARCH

The study focuses on online business registration in Brazzaville and aims to analyse its benefits for Congo-Brazzaville immigrant entrepreneurs in Cape Town. The research also focuses on benefits of the e-commerce website at CFBAP for service users, and hence does not examine online business registration service providers' related benefits. This research will not recommend any specific e-commerce technology to CFBAP, but as an institution, CFBAP should reconcile the findings of the study and future studies, evaluate the pros and cons of different e-commerce technologies, and then decide on the most appropriate technology for its potential e-commerce website, which should be managed at Brazzaville's head office. Based on limitations from the current study, the research proposes future research that will benefit CFBAP. A study should be conducted to ascertain the benefits of online company registration for service providers. Furthermore, an investigation should be conducted to assess the roles that CFBAP plays in the process of SMMEs' support in Congo-Brazzaville.

CONCLUSIONS AND RECOMMENDATIONS

Even though Congo-Brazzaville immigrant entrepreneurs are well established in Cape Town owing to certain reasons such as the high crime rate, xenophobic attacks, lack of access to resources, political uncertainty in SA and relative political stability in Congo-Brazzaville, the need to expand business activities back home has arisen. To enable them to register companies online at CFBAP and gain competitive advantage of e-commerce, it should establish plausible arguments, which constitute

business incentives for CFBAP policymakers to adopt such technology in Congo-Brazzaville.

If Congolese immigrant entrepreneurs avail CFBAP services through e-commerce technologies, they will receive more benefits in terms of time, cost and energy. Likewise, CFBAP will reduce personnel costs and gain closer access to the customer. Based on this concern, the present authors have outlined some tangible, but not exclusive, recommendations towards the benefits of online company registration for Congolese immigrants. These recommendations are chartered below.

Common commitment towards businesses expansion in Congo- Brazzaville

There is an urgent need for common commitment towards online business expansion in Congo-Brazzaville for Congolese immigrant entrepreneurs. Online business expansion will focus on reducing supply chain management costs and securing Congolese immigrant entrepreneurs' business profits. More than that, supported online business expansion would point to the fact that like in SMMEs, e-commerce will improve the country's GDP and its world ranking, and finally boost CFBAP's profile and its partners in an aspect that is at the core of its values. Furthermore, online business expansion constitutes an opportunity for Congolese immigrant entrepreneurs who face xenophobic attacks on a daily basis and lack of access to resources to secure a path of relocation through business growth in a safer and "ubuntu" environment in order to reach self-actualisation, instead of being constantly called "kwere-Kwere," meaning "foreigner". Therefore, there should be a need to implement an e-commerce website, which will offer an online company registration service in Congo-Brazzaville, which has innate inclination towards dignified global business growth, stimulates Congolese entrepreneurial mindsets and psychologically enables Congo-Brazzaville immigrant entrepreneurs to prepare to return home.

Successful business venture through CFBAP e-commerce website

In respect of online business expansion in Congo-Brazzaville, a potential CFBAP e-commerce website, which will impact positively on Congo-Brazzaville demographics, should first be implemented. A majority of Congo-Brazzaville immigrant entrepreneurs cannot profess successful business ventures through a CFBAP e-commerce website when traditional business registration rules the business world in Congo-Brazzaville. E-commerce, which refers to conducting business via the Internet, should extend to every nook and cranny of CFBAP's administration. In that case, those who carry public responsibility as top managers at CFBAP will set

the tone within CFBAP's administration, set the style of vigour, imagination and efficiency within CFBAP's potential e-commerce website, from which online company registration service will receive the expected respect. In fact, Congo-Brazzaville immigrant entrepreneurs who profess successful business ventures through a CFBAP e-commerce website will be heard at last. Finally, the overarching set of beliefs and ICT assumptions that are unquestioned will enable Congolese policymakers to build a mental picture, which promotes understanding of e-commerce within Congo-Brazzaville's cultural context.

Congolese commitment to adhere to GATS standards

In addition to successful business ventures through a CFBAP e-commerce website, there is a need for Congolese commitment to adhere to some important GATS standards such as e-commerce liberalization, which will enable the country to begin online trading with industries that have a comparative advantage. The need to liberalize e-commerce in Congo-Brazzaville is morally justified on the grounds that ICT is negatively related to Congolese French culture. This does not suggest that countries where a majority of people speak English do not have the highest Internet diffusion compared to French-speaking countries. However, e-commerce liberalization in Congo-Brazzaville will bridge the 2 digital divides namely between Congo-Brazzaville and the rest of the world, and between Congo-Brazzaville's male and female entrepreneurs. Hence, research findings will appear convincing as it has been revealed that Congo-Brazzaville immigrant entrepreneurs suit some of Hofstede's five cultural dimensions of effective usage of the Internet.

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Full Length Research Paper

Large shareholders, capital structure and diversification of Malaysian public listed manufacturing firms

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The study examines the interaction effects of large shareholders, capital structure and diversification on a firm's value. The findings show that diversification is non-linearly related to a firm's value. At the lower levels of diversifications, increased diversification is found to improve firm value. However, as the number of diversifications increased, it induces a negative impact on the differences in Tobin's Q value. The evidence shows that the interaction terms for diversification and excessive leverage enhance firms' performance suggesting the benefits of diversification in this economy. Further analysis reveals that regardless of the large shareholder-controlling stake, the presence of large shareholders appears to reduce the positive effects of diversification and leverage.

Keywords: Large shareholders, capital structure, ownership structure, diversification, Malaysia

INTRODUCTION

An efficient diversification could facilitate an effective internal capital market that reduces transaction costs, especially in a capital constraint economy (Khanna and Palepu, 2000). Despite this, the benefits of diversification are not always observable. The agency problem is generally agreed as one of the causes of diversification discounts (Denis, Denis and Sarin, 1999; Amihud and Lev, 1999; Li, 2009), however, the mechanism that causes the agency discount is still ambiguous a priori. Generally, anecdotal evidence suggests that over diversifying and excessive leverage leads to poor company performance in East Asian economies. However, due to limited domestic markets, firms in these economies more often than not diversify to expand their business bases. The country specific causes of diversification discounts in developing countries such as Malaysia are still yet to be established.

Three perspectives lead to the hypotheses in this paper. First, Claessens, Djankov, Fan and Lang (2003)

concluded that diversification in Malaysia is inefficient and accountable for the misallocation of capital objectives. Diversification could arise from controlling owners intending to enhance their private interests via empire building and unscrupulous investments (Jensen, 1986). The recent East Asian financial crisis literature also cites that capital investment in these economies is associated with higher leverage (Claessens, Djankov and Lang, 1998). Nonetheless, we are uncertain of the causal relationship between leverage, diversification and ownership structures which lead to the detriment of a firm's value. Secondly, Stein (1997) shows that diversification eases the problem of information asymmetry and facilitates firms' access to external capital markets. Therefore, a diversified firm is able to incur excess external capital that reduces underinvestment and enhances its performance. Peyer (2001) substantiates this proposition that multiple segment firms which access to external capital markets perform better than single segment firms. This implies that excess leverage in diversified firms could enhance performance.

Thirdly, along with the second argument, the finance literature also asserts that diversification creates the co-insurance effect that increases debt capacity (Levellen,

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1971). This can be achieved as different cash flows from various segments of businesses could offset each others variances, reduce default risks thereby increasing a firm's ability to obtain additional debt. Nonetheless, Mansi and Reed (2002) reveal that increased leverage as a result of diversification leads to negative firm performance. Likewise, Guo (2005) shows that high leverage and risky investments cause diversification discounts. On a similar note, Lins and Servaes (1999) point out that in Japan, diversification is not harmful to shareholders unless the firms belong to a keiretsu (where there is a main bank in each keiretsu organization). In summary, the findings imply that the ease of access to debt financing causes diversification discounts.

In view of the aforementioned, the real causes of diversification discounts are therefore not unambiguous. Firstly, Claessens et al. (2003) do not consider leverage when addressing diversification in their East Asia cross-country analysis. Therefore, the sub benefit of the diversification- coinsurance effect (leverage) is not taken into account. Secondly, diversification creates internal capital markets (Li, 2010) which reduce transaction costs in an inefficient external capital market. Therefore, an efficient diversification could lead to better firm performance (Li and Kami, 2008). The evidence is provided by Khanna and Palepu (2000) who used India as their sample in an emerging economy, found that as the number of diversifications increases, firm value improves. Third, diversification induces higher debt capacity that positively enhances firm value (Lee, Peng, and Lee, 2008). However, the East Asia crisis literature concedes that high leverage partially contributed to the crisis. Lastly, agency problem in reducing the positive effects of diversification is uncertain especially in emerging economies where diversification is tended to increase firms' business bases.

This paper contributes to the literature by integrating the issues of diversification, leverage and agency problem in a single framework. In the light that large concentrated shareholder is prevalent in this economy (Claessens and Fan, 2002), we therefore focus on the influences of the largest controlling shareholder in employing diversification on firm performance. The presence of large shareholders being board members should enhance monitoring and governing other directors from unscrupulous investments (Jensen and Meckling, 1976). However, in contrast to dispersed ownership structure firms in the developed countries, where shareholders have already diversified their portfolio risk, large shareholder controlled firms in developing countries diversify to realize pecuniary and non-pecuniary returns as compensation for bearing greater firm-specific risks. Their presence could accelerate exploitation process especially through unnecessary investment (Lins and Sarvaes, 2002). Therefore, we conjecture that:

H₁: Large shareholders induce diversification which negatively affects firm performance.

Two schools of thought address the reasons why large shareholders incur higher leverage to diversify. Firstly, Bebchuck's (1999) model shows that a large controlling shareholder is driven to enhance personal interest especially in a rent-seeking prevailing economy. In order to enhance the controlling owner's private interest, the controlling owner incurs higher debt so that his or her controlling interest is not diluted. Secondly, Grossman and Hart (1982) argue that a controlling owner employs higher debt to create "asset substitution" opportunity, where the risk of unscrupulous investment is transferred to debt holders who bear the utmost risk if a project fails, whereas controlling owners gain the utmost if a project thrives. Thus, this drives large shareholders to undertake inefficient and non-value maximizing investments such as diversifications. The hypothesis is given as follows:

H₂: Diversification induces higher leverage and affects firms' performance.

Lastly, we assess whether diversification per se induces higher leverage could positively affect performance as suggested in Lewellen (1971) and whether large shareholders could reduce the positive effects, with the following hypothesis:

H₃: Diversification induces higher leverage and positively affects performance. However the presence of large shareholders could reduce the positive effect.

METHODOLOGY

Tobin's q has been widely used as proxy for a firm's performance and value projection. Various proxies for the measure have been developed, for example the Lewellen and Badrinath (1997) and Chung and Pruitt (1994) models. For the current study, Chung and Pruitts' model was used as it is simpler and requires only basic financial and accounting information as compared to other models that requires complex calculations. Unlike most studies which treated dependent variable stagnantly, we apply changes in Tobin's Q as the dependent variable so that it captures the positive (premiums) or negative (discount) changes in firm value as the result of factors such as ownership structure, leverage and diversification. All other independent variables are valued at year t-1 to avoid endogenous problem.

In contrast to previous ownership structure studies which examine director ownership and large shareholders separately, we create an interaction term of large shareholders on director ownership so that the influences of large shareholders on insider directors could be captured. We measure the ownership structure (OS) variable as the interaction term of the largest shareholder (LARGE) and director ownership. (LARGE as dummy=1, if he is a director; otherwise 0). When LARGE equals 1, the continuous variable of the interaction term reflects the influence of large shareholders on director ownership. The zero value of the interaction term (when LARGE=0) implies that the largest shareholder is unable to exert influence on the board of directors.

A multiple segment firm is defined as a firm where no single segment contains sales of more than 90%. The number of segments (SEGNUM) is counted accordingly from KLSE on disc, over various years. We also create a dummy variable (DIVER) equal to 1, for multiple segment firms, otherwise it is equal to 0. Leverage (DE) is defined as debt over equity. The excessive leverage (DED)

variable is set equal to 1 if the value above each industrial median is at 3 –digit Malaysia Standard Industrial Classification (MSIC), otherwise it equals 0.

Based on a lag year of (t-1), the above model allows us to address the first and second hypotheses. When the dummy for DED and DIVER equals 1, we could address the second hypothesis on the presumption that controlling owner incurs higher leverage for diversification. This reflects that if the controlling owner intends to enhance his private interest, the agency problem could simultaneously lead to excessive debt and diversification.

In order to address the third hypothesis, we use diversification variables and other variables at year (t-1), whereas leverage (DE) and its proxy (DED) are valued at the same level year, (t). The significance of the interaction term between excessive leverage and diversification and its impact on firm value is suggestive of diversification (at t-1) has caused excess leverage (at t) which could

positively affect firm value. In addition, the inclusion of the ownership variable (OS at t-1) into the aforementioned interaction term we postulate that it could adversely affect firm value.

The control variables consist of industrial market competition (CR45) at 5-digit MSIC. Industrial competition is documented in the literature as exerting competition pressure on ownership and performance. Intangibl assets (INTAN) which is normalized by fixed assets represents the growth opportunities and may influence the dependent variable. Export orientation (EXPORT)-, export divided by total industrial output, is included to capture the international trade impacts on firm value. Firm theory variables which directly affect firm value are (i) cash flow- (CASH)-proxy as profit before taxation plus depreciation and deflated by sales and (ii) risk-(STD) measured as standard deviation of the firm’s weekly share price movement, from 1994 to 2000. To examine these variables, we postulate our base model as follows;

$$\Delta \text{ V a l u e} = \alpha_{i,t-1} + \sum_{i=1}^3 (\gamma_1 + \gamma_3 \text{ D I V E R }_{i,t-1} + \gamma_5 \text{ D E D }_{i,t-1}) (\text{O S})_{i,t-1} + \sum_{i=1}^3 (\gamma_2 + \gamma_4 \text{ D I V E R }_{i,t-1} + \gamma_6 \text{ D E D }_{i,t-1}) (\text{O S}^2)_{i,t-1} + \gamma_J \text{ S e g n u m }_{i,t-1} + \gamma_K (\text{D E})_{i,t-1} + \gamma_M (\text{S e g n u m } \times \text{D E D})_{i,t-1} + \gamma_N (\sum_{i=1}^n \text{C o n t. V a r.})_{i,t-1}$$

Where Δ value = The difference in Tobin’s Q value between year t and t-1. Tobin’s Q is measured by a firm’s market value plus total debt divided by book assets.

OS = Ownership structure. Dummy variable of large shareholder as director (LARGE) interact with director ownership (Dir). LARGE equals 1, if large shareholder is also a director, otherwise equals 0. Segnum = Number of segments for diversification.

DIVER= Diversification. Measured in dummy values as multi-segment equals 1, otherwise=0.

DE =Debt/equity

DED= Dummy of excess leverage above each industrial leverage median for 3-digit Malaysia Standard Industries Code (MSIC). DED=1, otherwise=0

Cont. Var= Control Variables

Sample selection and descriptive statistics

We select public listed manufacturing firms as our subject of study as these contributed around 41% of all listed firms in Bursa Malaysia in 2000. The firms are also highly weighted in terms of capital as compared to other segments in the economy. We collected 185 unbalanced sample firms from both consumer product and industrial product segments which have their segmental reporting in the KLSE on disc for the sample period from 1994 to 2000.

We show the descriptive statistics in Table 1. The changes in performance- Δ TOBQ reflect a fair distribution of –4.45 to 4.28. Director ownership seems to be large with total accumulated equity interest mean of 35%. The maximum value in leverage is 5.00 indicating high leverage in this economy. The maximum number of diversifications is 7. With the exception of ownership structure variables-LARGE and DIR, other main variables applied in the model appear to positively influence the dependent variable. This also highlights the possibilities of ownership structure in exerting detrimental effects on a firm’s performance through mechanisms such as leverage and diversification.

Table 2 shows that single segment firms perform significantly

better than multiple segment firms. Ownership variables are not deemed to be different among single segment and multiple segment firms. Large total asset firms (LOGTA) are also significantly associated with multiple segment firms. Corroborating the earlier hypotheses, leverage is also higher in multiple segment firms, which indicates the possibilities of efficient internal capital markets and co-insurance effects. However, we are uncertain of the real causes of the diversification discount. The regression analysis in the next section, with interaction terms, shed some light on our understanding.

RESULTS OF THE REGRESSION ANALYSIS

To address the first and second hypotheses, all independent variables in the first model are valued at year t-1 (Table 3, model 1). The findings show that diversification follows a non-linear relationship. In contrast to Khanna and Palepu (2000), a low level of diversification (SEGNUM) is found to improve firm value (with a positive coefficient of 0.09836). However, as the number of diversifications increased (SEGNUM²), it induces a negative impact on the differences in Tobin’s Q value.

The interaction term of OS x Diver shows a positive value, but as the controlling interest of large shareholders increased (OS² x Diver), the coefficient sign turned negative. Therefore, in addressing the first hypothesis, we signify that as controlling shareholders increase their shareholding, diversification causes negative firm value. Interestingly, the interaction term of (SEGNUM x DED)_{t-1} is found to exert 0.75% improvement in the firm value at a low p<0.10 level. This provides support to hypothesis 2 and Stein’s (1997) proposition that excess external capital enhances diversified firm performance.

Table 1. Descriptive statistics.

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Obs.	Correlation
ΔTOBQ	-0.17	-0.07	4.28	-4.45	0.57	851	1
DIR	35	39	85	0	1.25	745	-0.0728**
LARGE	23	18.7	1	0	0.49	906	-0.1061***
DE	1.03	0.43	5	0	1.2	914	0.1638***
DED	0.5	1	1	0	0.5	914	0.0612**
CR45	0.41	0.35	1	0	0.26	973	0.0538**
INTAN	0.2	0.01	20.28	0	1.12	864	0.0063
EXPORT	0.62	0.39	18.19	0.01	0.98	928	-0.0029
CASH	0.06	0.1	1.53	-14	0.52	972	-0.3767***
STD	7.81	6.79	29.63	-0.09	3	828	0.0630**
LOGTA	12.24	11.91	16.57	8.81	1.28	936	0.108**
SEGNUM	2.43	2	7	1	1.43	960	0.09**
DIVER	0.45	0	1	0	0.5	960	0.01

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level, Obs. Observe.

Table 2. Analysis by segment.

Diversification		TOBQ	LARGE	DIR	LOGTA	DE
Single segment	N	635	618	500	649	650
	Mean	2.430	0.361	35.401	5.240	0.260
	Median	2.240	0.354	38.705	5.100	0.200
Multi segment	N	426	419	353	428	421
	Mean	1.860	0.357	35.636	5.490	0.320
	Median	1.450	0.379	38.670	5.370	0.310
ANOVA	(t-value)	(35.84)***	(0.179)	(0.018)	(29.05)***	(9.90)***

***Significant at the 1% level.

Further investigation by comparing single segment and multiple segment firms (DIVER) found negative effects from the agency problem (Table 3, model 1). In a single segment firm (where Diver= 0), the degree of controlling large shareholders in applying excessive leverage $(OS \times DED)_{t-1}$ to cause deterioration in firm value is found to be inconclusive. In a multiple segment firm (where Diver=1), the negative influences of 0.038% $(OS \times DED \times DIVER)_{t-1}$, is found to be larger than single segment firms. The finding is however inconclusive, implying that large shareholders incur higher leverage and diversification which negatively affects performance, is not substantiated.

Model 2 shows the robustness of the results. The leverage (DE) and its dummy (DED) are valued at the same level year, while other variables are valued at lag year (t-1). All coefficient signs are found to be consistent as in the first model. The presence of relatively large shareholder as director (OS^2) is also found to contribute to diversification discounts.

The coefficient of the interaction term $(SEGNUM_{t-1} \times DED_t)$ is found to enhance 8.54% ($p < 0.10$) improvement in firm value which further confirms Stein's (1997) theory. The value appears to be higher as compared to the first model, which further confirms the co-insurance effect. This explains why diversification induces excessive leverage which enhances firm value. The finding supports Lewellen (1971) and Peyer (2001) but is inconsistent with Mansi and Reed (2002) who argued that leverage causes diversification discounts.

Again, in single segment firms (where Diver=0), the interaction term of $(OS_{t-1} \times DED_t)$ is negative but insignificant. It shows that controlling large shareholders do not deliberately increase high leverage to cause adverse effects on firm value.

Nonetheless, in multiple segment firms, the negative coefficient of interaction term of $(OS_{t-1} \times DED_t) \times (DIVER)_{t-1}$ confirms that the agency problem reduces the total positive effects of interaction terms of higher diversification (at year t-1) and higher leverage in the

Table 3. Regression analysis of unbalanced panel data in estimating firm value as a function of the director ownership.

Variables	Model 1 DIRLARGE × DED _{t-1}		Model 2 DIRLARGE × DED _t	
C	-0.19285	(-6.8942)***	-0.17136	(-4.5232)***
(OS) _{t-1}	-0.00332	(-4.0571)***	-0.00267	(-1.7477)*
(OS ²) _{t-1}	0.00005	(4.7284)***	0.00005	(2.2177)**
(DE) _{t-1}	-0.01318	(-2.3139)**		
(DE) _t			-0.00027	(-0.1369)
(SEGNUM) _{t-1}	0.09836	(7.5149)***	0.07076	(3.7479)***
(SEGNUM) ² _{t-1}	-0.01119	(-5.9542)***	-0.00786	(-2.9239)***
(OS × DIVER) _{t-1}	0.00405	(3.9206)***	0.00428	(2.4415)**
(OS ² × DIVER) _{t-1}	-0.00006	(-4.1678)***	-0.00006	(-2.5097)**
(SEGNUM × DED) _{t-1}	0.00750	(1.6881)*		
(SEGNUM _{t-1} × DED _t)			0.00854	(1.9577)*
(OS × DED) _{t-1}	-0.00030	(-0.9163)		
(OS × DED × DIVER) _{t-1}	-0.00038	(-1.0423)		
(OS _{t-1} × DED _t)			-0.0004	(-0.6629)
(OS _{t-1} × DED _t) × (DIVER) _{t-1}			-0.00385	(-1.7843)*
(CR45) _{t-1}	0.02216	(1.2117)	0.02803	(1.1139)
(INTAN) _{t-1}	0.00221	(0.7076)	0.09093	(2.1727)**
(EXP) _{t-1}	-0.00760	(-6.2244)***	-0.01102	(-6.5543)***
(CASH) _{t-1}	-0.32996	(-8.1898)***	-0.19524	(-3.0939)***
(STD) _{t-1}	-0.00006	(-0.0757)	-0.00068	(-0.5702)
R ²	0.472		0.4372	
Adjusted R ²	0.455	W=2.063(6)	0.4094	W=9.995(7)
S.E. of regression	0.432	P=0.15	0.4094	P=0.000
F-statistic	28.563	Serial=0.611	15.7285	Serial=0.595
Prob(F-statistic)	0	N=185	0	N=161

ΔTOBQ is the difference of TOBQ between t and t-1. OS (ownership structure) refers to DIRLARGE- DIRECTOR × LARGE where LARGE =1 when a large shareholder is present, otherwise=0. Director is the percentage of share owned by directors DE is the debt over equity ratio. DED is the excessive leverage of the firm when DE is above each industrial median, dummy equals 1, otherwise 0 for each year. SEGNUM is the number of segments. DIVER denotes diversification where multi-segment=1, otherwise = 0. CR45 is the output concentration ratio for four largest firms based on Malaysia Standard Industrial Classification code at 5 digit respectively. INTAN is the intangible asset normalized by fixed asset. EXP= Export based on two digit industrial code; CASH= Free cash flow / Total sales, free cash flow is calculated as profit before taxation plus depreciation. Std is defined as standard deviation of the firms' weekly share price from 1994 to 2000. W- wald test of joint significance of ownership (OS and OS²) and others interaction explanatory variables. Number of parameters in parenthesis. Serial: Ho: No autocorrelation in second order. The value refers to P-value. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level. t-statistics are in parentheses.

subsequent period (at t). The consequence is the significant negative value of 0.385% changes in firm value. The higher order of OS does not exert any impact. Therefore, regardless of the large shareholder-controlling stake, their presence could be detrimental to the positive impact (internal capital market and co-insurance effects) created by the diversification. The large shareholder possibly expropriates this through tunnelling and insider

trading.

Conclusion

The study examines the interaction effects of large shareholders, capital structure and diversification on a firm's value. Using 185 unbalanced sample firms in the

manufacturing sector, the findings show that diversification is non-linearly related to firm value. Although a relatively large shareholder is found to be accountable for the negative effects of diversification, there is no evidence of excessive leverage for diversification to the detriment of firm value. In fact, the interaction term for diversification and excessive leverage enhances firms' performance signifying the benefits of diversification in this economy. This corroborates Stein's (1997) efficient diversification model and Lewellen (1971) co-insurance effect proposition. Lastly, regardless of the controlling shareholders' interest, the presence of large shareholder appears to reduce the positive value of diversification and leverage. Therefore, the policy should be focused towards large shareholder activities such as insider trading, and tunnelling which could offset the positive effects of diversification and leverage.

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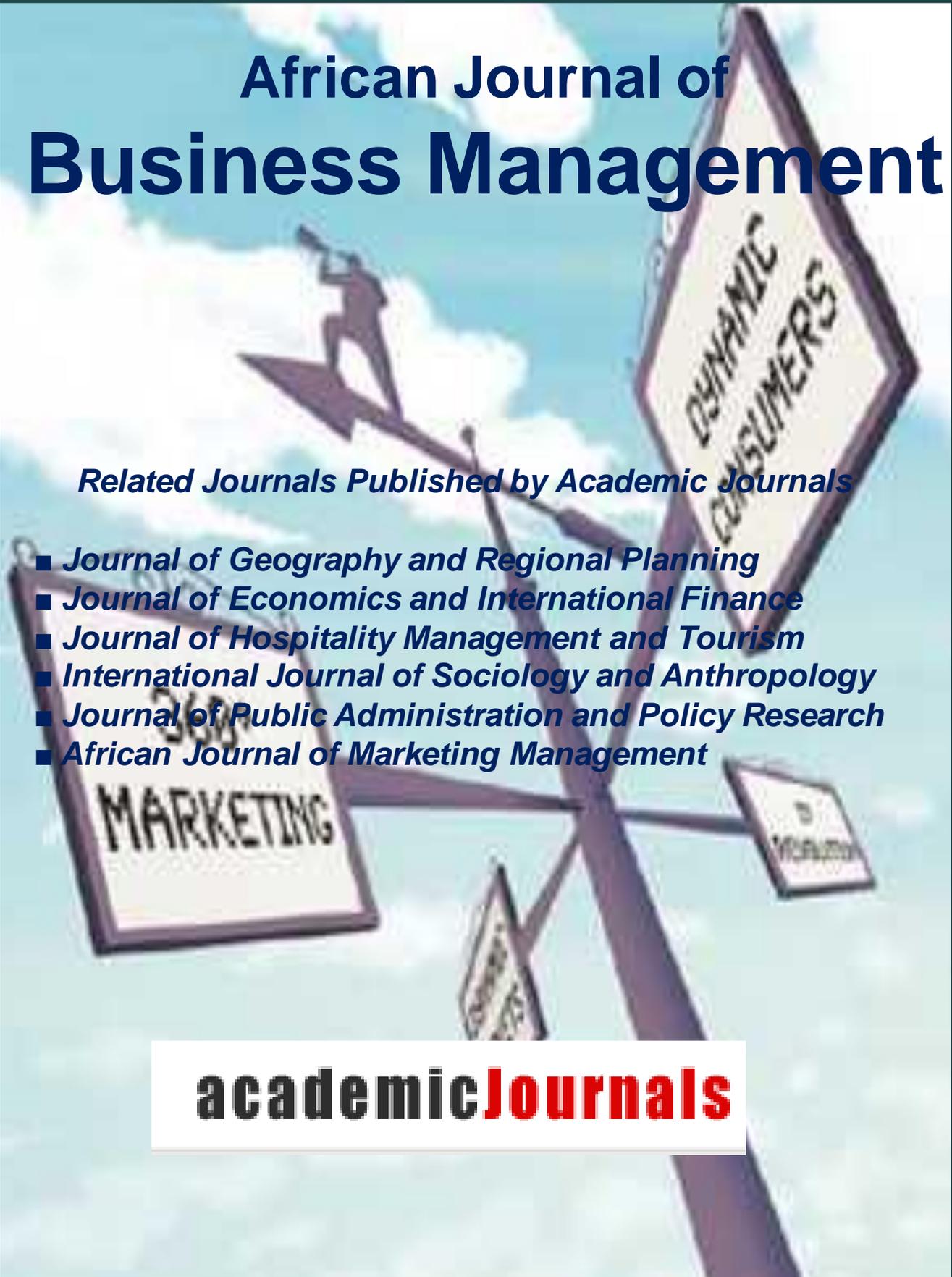
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