

African Journal of Business Management

Volume 8 Number 18 28 September, 2014
ISSN 1993-8233



*Academic
Journals*

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Review

Significance of credit risk in economies in transition

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Received 12 April, 2010; Accepted 13 June, 2014

Uncontrolled wish for even larger profits led to neglecting the significance of credit risk, and later on to bankruptcy of American mortgage banks that significantly initiated the world economy crises. If credit risk manifested itself in a relatively stable economy such as American, it is not hard to draw a conclusion how important is quality credit risk managing in economies in transition, which are fragile and unpredictable. Economies in transition are characterized by powerful economic, debtor-creditor, and credit expansion. Serbian economy as an example shows that even traditionally rigid banks did not manage to resist the negative impact of great credit risk while the economy felt drastically this negativity through system illiquidity, blocked accounts and ceasing of business systems. All that in transiting economies manifested as positive, with generation of economic crises demonstrated as a serious negativity. Economy sponsors in transitions who “manad” economic prosperity (foreign investors), in conditions of crises turned to their own problems while the sponsored economies were left weak to preserve themselves from recession. The oncoming period will be, obviously, a period of general rigidity of economic system since it is hardly believable that anybody will afford the luxury of un-inspecting debtor – creditor relations without quality obligations; this referrers to both micro and macro economic levels where state economies should maintain a highly restrictive monetary policy.

Key words: Credit, risk, crises.

INTRODUCTION

Credit risk is a “phenomenon” that is known to all business systems that materialize their goods or services in the market with postponed payments. Credit risks come down to a simple question of weather we have made a quality estimation of buyer’s payment capability, that is, weather the buyer will pay the goods or services sold in the way as stipulated by the sales-purchase contract. Credit risk is most often thought of in the context of banking and the risk of credit (*loan*) granting (Vasiljević and Koprivica 2009). Such interpretations are wrong because credit is not only a banking product, but is (although it is not named so) any situation in which one

entity gives to another something expecting that the given value will be paid back in the future (Bjelica, 2000; Kovačević, 2004).

How serious consequences of uncontrolled exposing to credit risks is shown by the fact that the present global economic crises was predominantly initiated by high credit risks of American mortgaging banks. Striving for even larger profits these banks were crediting purchasing of apartments and houses of clients with dubious credibility. This is the lower middle class of the American society that ended up with their credit debts on existential seesaw, that is, they have become very vulnerable

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against the least negative economic and social disturbances in the society. For a significant period, the mentioned “seesaw” worked in favor of mortgaging banks, which encouraged by the conditions, kept even more intensifying mortgage crediting involving numerous investment funds, creating thus a chain of interlocked and interdependent business systems. When the “seesaw” swung against the banks because of the decrease of population’s standard of living, loss of jobs, inflation, increase of living costs, negative exchange rates for the borrowers, the process became unstoppable on a short run and drew into bankruptcy a chain of all business systems that were connected with the mortgaging crediting. The result of mass incapability to pay back the borrowed money is obvious and manifests in economic crises globally spread, in crash of construction industry, real-estate market crash, deep recession, social unrests. The situation may be interpreted as a set of circumstances, cyclicity in growth of economies, and so on; however, the facts are much simpler. The crises initiator is no superior force but extreme wish for profit that ignored the significance of credit risk and gravity of consequences originating from uncontrolled crediting. All this happened in the USA as a developed and stable economy. When we say the economy is stable and developed, we first think it is controlled, predictable, which makes predictions and deciding much easier, and, also, that it is sufficiently independent, that is, the economic motions do not produce the predominant impact. All of the characteristics that we understood in developed and stable economy are opposite to characteristics of economies in transition which, undoubtedly, belongs Serbian economy, too; so it is not hard to conclude how significant is credit risk managing in such an economic environment.

SIGNIFICANCE OF CREDIT RISK IN ECONOMIES IN TRANSITION

Transition is a very much-used term, frequently without any grounds, or out of ignorance. Economy in transition may be considered as an economy exiting from one social order – socialistic, in which protectionism and State interfering with economic flows were characteristic, to “capitalistic” social order where economy is freed of protectionism and opened to foreign competition that intends to become, some day, a part of the milieu, the values of which it accepts without any reservation. This transitional road will end, if there is an end, with new protectionism and State control of economy that are characteristic for EU countries, as well as for other developed economies. Economies in transition share a similarity that is the wish for quick economic growth, “primal accumulation of capital”, uncontrolled infiltration of foreign capital, inclination towards neo-liberal concept of dealing, change of capital ownership structure, a lot

higher cost of capital than the one in developed economies, population’s outstanding wish to make up for the previously poor living standard in a time as short as possible, uncontrolled infiltration of “dirty technologies”, significant influences of IMF and WB regarding fiscal and monetary policy, developing foreign investments’ addiction. Bearing in mind the listed characteristics of economies in transition, we believe, that by analyzing credit risk managing in Serbian economy, we will present the prevailing conditions in all economies in transition.

Until 2000 Serbian banking resembled credit funds more than institutions that are supposed to provide a scope of financial services to their clients. Small and medium companies and especially the population were deprived, practically, of serious crediting, while this privilege was reserved for larger business systems, only. After 2000 foreign banks made a powerful entrance onto Serbian financial market, while the next significant moment was January 1, 2003, when the payments circulation got transferred from the State institution into banks. At that moment all the banks gained prerequisites for un-obstructed rendering of all banking services. The population that lived for a very long time in conditions of economic isolation and in poor living standards without serious possibilities to provide for themselves a living space, automobiles, furniture, utensils, and so on by way of credits, all at ones find themselves in a situation to be offered all of that, and very aggressively, at that. Foreign banks that entered the Serbian market were aware of the population’s great “hunger” for consumption, and were also aware that in such a surrounding of, practically, unlimited demand, they can make incomparably higher profits than by crediting in their domicile countries. Vast demand for credits by the population and outstandingly high profit rates (interests) that banks made by such crediting placed in the second plane the concern of excessive exposure to credit risk. That was done perfectly consciously since the banks were calculating that a number of credit consumers will not be able to settle their obligations (5-6%), but the profit rate was high enough to absorb the losses caused by unpaid credits and provide a satisfactory profit for the bank. In Figure 1, we present the bank portfolios’ trend expressed in billions of RSD.

Based on the presented graph we can see that in the period of 5 years banks’ portfolios towards population grew more than four times. The reason of such an expansion is mostly a low starting position, that is, the fact that in the previous period the population was not in the position to use bank credits. The remarkable credit expansion could not have been achieved without a drop in qualifying criteria for credit consumption and increased exposing to credit risk. The credit risk was somewhat absorbed by the fact that Serbian economy entered, from the state of isolation into the state of uncontrolled capital infiltration that made the issues of employment losses and drop of living standards non actual; instead the

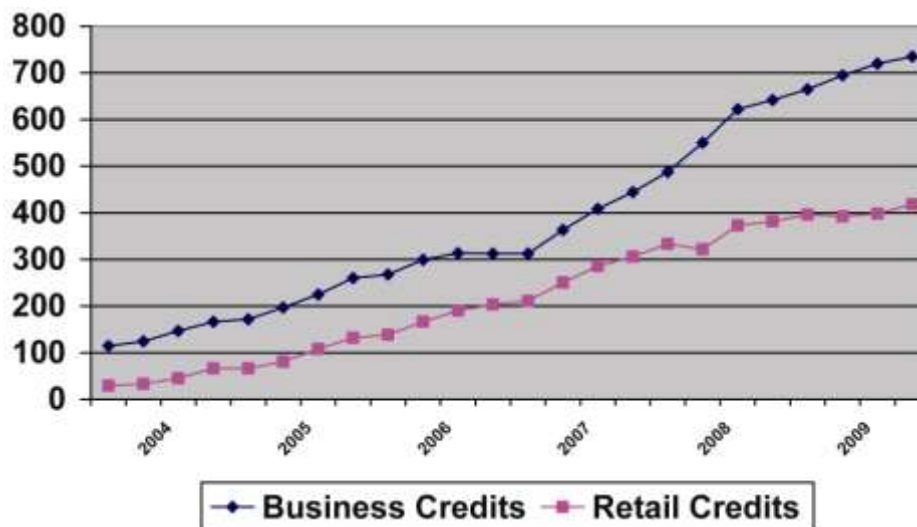


Figure 1. Banks' lending to business and physical entities in the period 2004-2009.

current issues were new jobs, employment increase, and living standards increase. Just like all transiting economies, also, the Serbian economy was, and is still depending on foreign capital input, which, to the difference of all the previously mentioned characteristics of the stable economies, makes it very dependent on economic trends in the surrounding. This kind of dependence makes the economy in transition very fragile, and regardless of the semblance of growth and prosperity, the economies are not stable because neither the growth nor prosperity are the results of their proper efforts and capacities, therefore they are not subject to control of the national economy policy.

How dependent transiting economies are on the foreign factor shows the present world economic crises that caused foreign capital to turn to solving its proper illiquidity problem instead of creating economic ambient and market in transiting countries. The result of this is that countries in transition, including Serbian economy, in these critical conditions get short of financial resources, being too weak to produce by themselves the additional value that would maintain growth and economic development, waiting for new investors and lessening the criteria (protective mechanisms against foreign competition) to the lowest possible level. In such conditions, the puffing Serbian economy started slowing down, which unavoidable produced surplus of employees who were necessary in the period of economic expansion, while the labor power that was not surplus was degraded and the ambient of general social insecurity was created. All this is visible in Figure 1 through stagnant banks' portfolio towards population (retail) in the critical 2009, for banks are maybe the best indicator of the economic and social conditions (money always runs away from risk). In economic crises conditions foreign banks have directed

their financing towards their domicile countries (Figure 2) safeguarding the stability of the Head Bank, whereas on the other hand they have become very concerned about credit risks in conditions of social and economical instability (Kovačević, 2004; Vasiljević 2001a, b)

The above mentioned concern is not typical for foreign banks only, but also, of other investors, which may be noticed in Figure 1. Increased rigidity of business banks is manifested not only compared to new lending but also towards the old credit arrangements that are slowly getting problematic, which is visible in Figure 3. The banks are desperately trying to save previously approved, and now dubious credits, partly through reprograms, selling collaterals by free negotiations, and partly through selling claims with discounts.

We can easily notice in Figure 3 that percentage of dubious loans in total banks' lending doubled in only one year, the period that Serbian economy was exposed to the world crises. The presented data acquired from the National Bank of Serbia show loans repayment delayed by more than 90 days. However, the situation is far worse because the banks have reprogrammed a great number of loans trying to find solutions, together with the consumers, for timely settling of obligations. The said reprograms of loans are dubious, but they are not in the category of non-performing loans since the banks have postponed maturity dates by administrative procedure. Only in the second half of 2010 may we expect to see the effects of reprogramming and further negative shifts expressed through increase of non-performing loans in total bank lending since it is hardly probable that all reprograms will realize banks' expectations.

Earlier in the text, we have mentioned that credit risk is not only a banking category but also the one appertaining to all of those who sell their goods or services in the

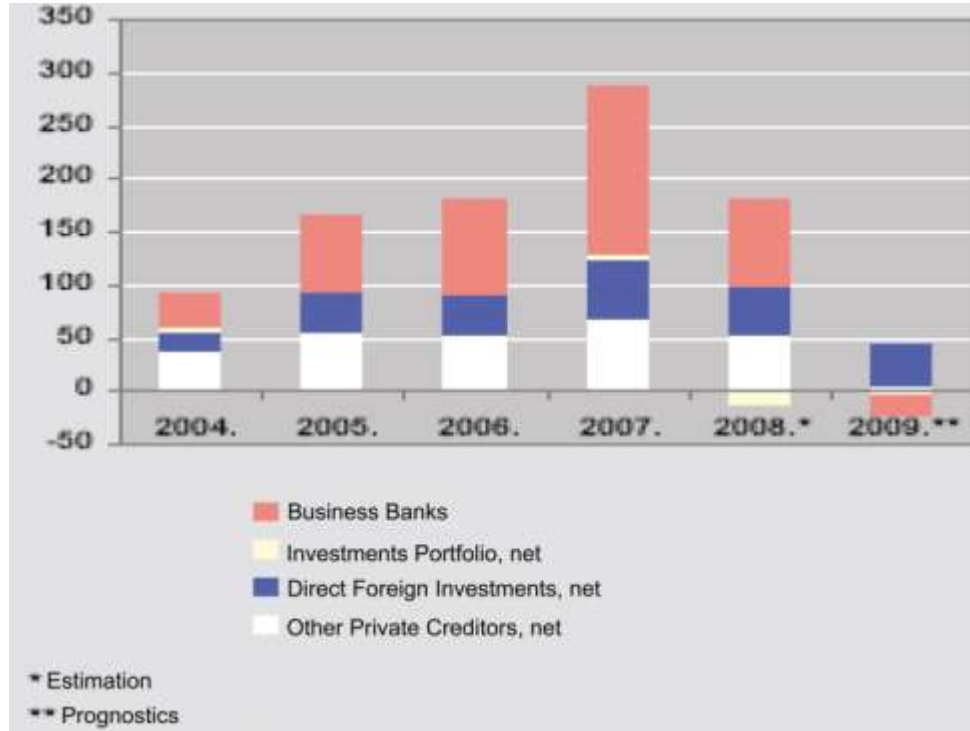


Figure 2. Capital inflow to markets to European developing countries.

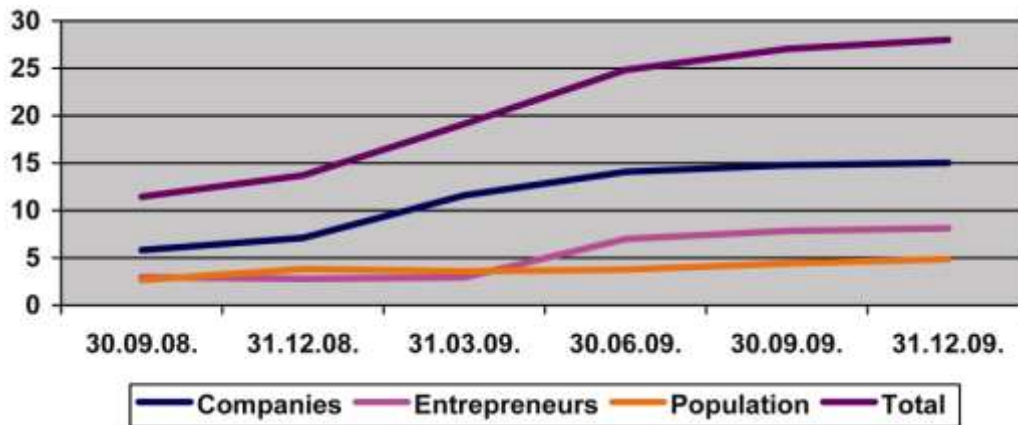


Figure 3. NPL (non-performing loans) trend in total bank lending (%).

market with postponed payment. As we also have said in the text, before the world crises, Serbian economy was showing, just like all economies in transition, a trend of expansion and development of small and medium entrepreneurship. In such circumstances small and medium companies raced to conquer the market not taking care to whom and under what conditions are they selling their goods or services. The seeming expansion of small entrepreneurship, statistically supported by enviable growth of local gross product (Figure 4) was highly un-

sound since a long chain of non-regulated debtor–creditor relations was made that had no quality obligations arrangements backing. After the world crises got more significantly integrated into economy flows, debtor–creditor chains started “breaking” producing the illiquidity spiral. And, like all economies in transition, Serbian economy got and still is overburdened by State’s impositions (taxes, duties...) for which the State demands to be paid regularly settled because due to the lack of significant investment from abroad there are no other

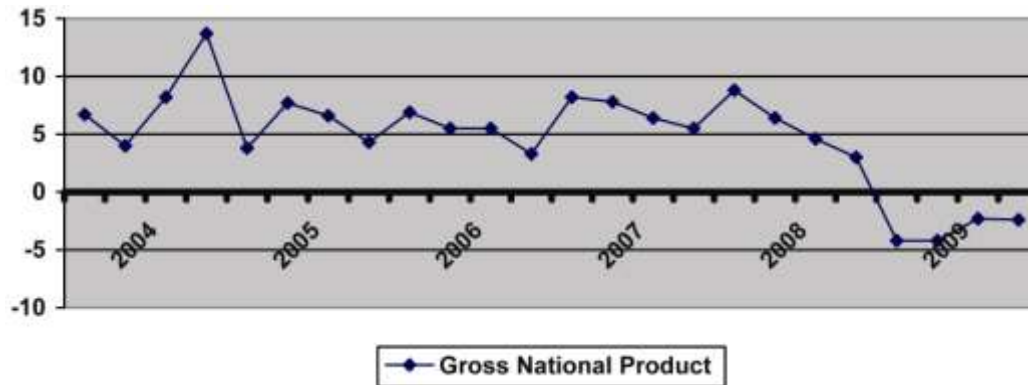


Figure 4. GNP of the Republic of Serbia's trend in the period 2004-2009.

ways to fill up the budget deficit. At that moment the entire destructiveness of uncontrolled exposition to credit risk surfaced out because the economy got into the position of having to pay their debts to the State regularly, but was not able to collect their own claims. The result of this situation was that in 2009 about 70.000 companies had blocked accounts, which meant employees were not paid so the banks which could not collect their claims from the companies had a problem, and they still have the same problem. They could not have collected their claims from the employees of those companies who are the credit beneficiaries. Then it turned out that financial statements in the past period were not realistic, because they contained a significant revenue that actually was not really collectable, and that fact manifested in 2009. If it is possible at all to speak of a positive side of the world economic crises than it is that the economy came to its senses which was noticeable in 2009, since hardly any one sells their goods or services for a postponed payment without previously having checked the customer or without a quality obligation relationship with the customer. Credit risk in earlier period was neglected in economy and that was an attribute of rigidity has become a dominant factor of business operations that will in time clear the economy of business entities that survived in the market by tricks and continuous compensating of old obligations with the new ones. In previous part, we have mentioned that inadequacy of credit risk in a stable and predictable economy (USA) triggered the global economic crises, which leads to a conclusion in what ratio it is existentially important to be concerned about credit risk in transiting economies that are not stable but rather predominantly dependent on foreign factors, which makes them most unpredictable. In Figure 4 we present GNP of the Republic of Serbia's trend in the period, 2004-2009.

The next period in Serbian economy requires maximum tightening of criteria towards the customers, which is something that banks are doing; however, banks are facing problems of existent loans, especially with the population. By the Republic of Serbia Government's Plan,

according to the IMF's suggestions, pays in public sector that are presently the largest employer and the pensions will be frozen during 2010. Situation like this is not typical only for Serbian economy, but of all economies in transition, as well as of developed economies hit by the crises, such as Greek, Portuguese, Spanish. Many citizens whose pays will be frozen next month are credit beneficiaries and the issue is if they will, with the rising exchange rate (the credits are mostly with foreign currency clause), rising costs of living and decreasing standard, manage to pay their credit debts, or, will in banks start to grow numbers of dubious loans. Figure 5 presents growth trend of costs of living in period 1997 - 2009. Based on these facts we have presented hypothetical, but quiet realistic example of a situation in which an average credit beneficiary may find himself, in not only Serbia, but anywhere where economic circumstances are similar (Vunjak, 1994).

If we take as an example that an average citizen, in February of 2007, got a credit from the bank, for a term of four years, the situation will be as follows: we can take that the credit beneficiary's pay in February 2007 was €500, that is, according to the exchange rate at the time (79.9900) about RSD 40.000. The NBS allows pays to be encumbered only up to 30%, which at that moment was €166.5, that is RSD13.318. According to the parameters the customer could have borrowed € 6.000 for a repay period of four years. In February 2010 the exchange rate € against RSD is 99.5236, which means that an installment is RSD 16.471, that is, it is RSD 3.153 higher compared to the beginning.

At the beginning of the period, the amount of income less the credit installment (the amount available to the customer for regular daily needs) was RSD 26.682, while in February 2010 this amount is RSD 23.529. Further, we can assume that the growth of costs of living in the period 2007-2009 was of about 20% that additionally decreases afore mentioned available amount for about RSD 8.000. Finally, we conclude that the credit beneficiary has come from the available RSD 26.682 in 2007, when the loan

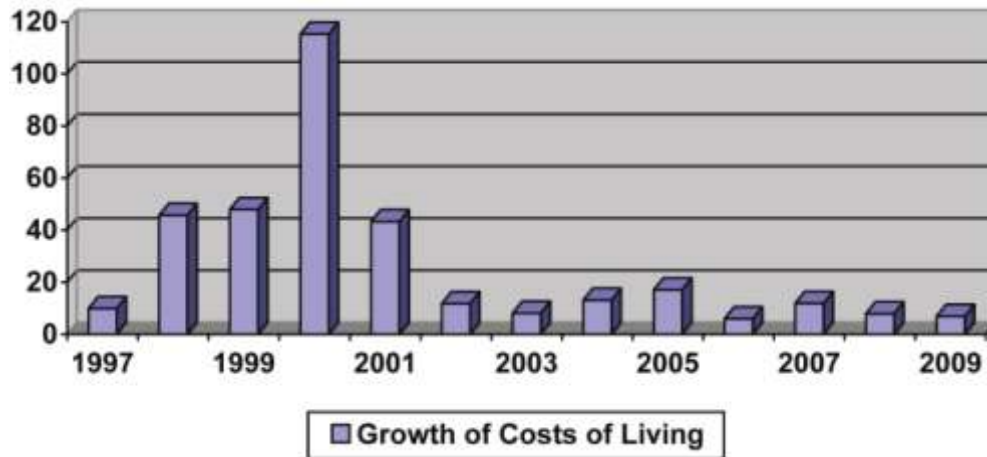


Figure 5. Trend of growth of costs of living in the period 1997-2009.

was taken, to the available RSD 15.519 (23.529-8.000). That means a decrease of family budget of about 42%. Of course, in the said period, there have been increases of pays, which most certainly never were 42%, so that we can state with high level of certainty, even without official data, that the family budget in our hypothetical example suffered a decrease of 25-30%. Bearing in mind the above-mentioned freezing of pays in public sector and pensions, further pressure onto family budgets of credit beneficiaries is due, and it is only the question of limits of depriving (of food, clothes...) in favor of credit installments, because when that limit is transgressed, cessation of due credit installments settles in.

Conclusion

Even though banks are thought to be very rigid and conservative institutions, that rigidity could no save them from significant percentage of dubious loans in total of their proper placements. As causes of the world crises, a number of different factors are listed. They have one common quality; somebody else is culpable, always. Heading the list are economies in transition that have, in conditions of economic prosperity, completely "leaned" onto investors from developed countries and have let themselves create ambient based on neo-liberal economic principles. Hardly anywhere will be mentioned personal liability for incautiousness in sales of goods and services to dubious buyers. Most often, the argument is the alleged pressure of the State for timely payment of taxes and contributions, inadequacy of the judiciary system and impossibility to collect claims.

Nevertheless, if matters are analyzed in their core, every State always requires that dues be paid regularly and on time, judiciary system was inadequate in the time of economic progress, as well, so the only thing that may be controlled, which is marginalized, is personal

responsibility for poor estimation of paying capacity of proper customers. Regardless of the negativities caused by the crises in economy and social system, at the end it will clear the business and economy of dubious business systems that have continued through years by going from one into another obligation and it is most likely that economic system will prevail consisting of really sustainable business entities where we can only hope that continuous "hunger" for yet additional profit will not influence oblivion of the crises or the existential significance of credit risk quality managing.

Conflict of Interests

The authors have not declared any conflict of interests.

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Review

Cross-comparison of turkey and EU27: Political versus economic development in Turkey

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Received 20 January, 2011; Accepted 06 August, 2014

This paper aims to present whether the economic growth of Turkey can parallel the political developments within the country. By evaluating the data available and with commission reports, the paper compares the economic indicators including GDP, unemployment rates, and inflation rates with political values such as democratization indexes. Our hypothesis claims that, even though economic and political indicators are converging, the developments experienced in economic values are well better compared to political indicators. The paper will econometrically test the hypothesis with correlation coefficient method and OLS regression procedure in order to verify if there is a convergence or divergence between political and economic indicators of the Turkish economy. Based on the data analysis, the research expects to conclude that the political growth of Turkey on the way towards EU membership lags behind economic growth.

Key words: Political indicators, economic indicators, Turkey, European Union.

INTRODUCTION

Turkey, as a candidate country, has achieved crucial steps on the way towards EU membership. The long-standing European integration process has witnessed cornerstone agreements which paved the way for further integrations of several candidate countries who have successfully adopted the “acquis” of the Union. Turkey, whose first application for full membership was in 1959, has achieved the candidate status in 1999, six years after the Maastricht Treaty transferred the European Community to European Union.

The long process of adapting the “EU acquis” to their own systems right before the full membership is a

precondition to all candidate countries wishing to be a part of the long dreamed European project. The Progress Reports are the regular analyses of how far each candidate country has achieved in the EU harmonization process. Turkey has also been evaluated by those Regular Progress Reports each year. Political and economic adjustments are the foremost priorities for Turkey, and this paper aims to understand and compare how far Turkey could achieve economic and political progress in this complex road until 2009.

It is a fact that various studies have already been done to analyze economic and political indicators of Turkey.

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However, the comparison of both indicators is one of the most important steps as long as progress in one without a complementary progress in another is not sufficient to become a full member of the Union. The first chapter of this paper will examine and review the related previous studies and analyze how they relate to the study of this paper. The second part will examine where Turkey economically and politically stands in this longstanding path and encompass the Progress Reports of years 2000 reflecting the first year after the candidate status is received, 2008 and 2009 reflecting the final situation of Turkey. Finally, the third part will encompass the analysis of the economic indicators including GDP, unemployment rates, inflation rates, corruption, and political values such as democratization indexes. This part will econometrically test the hypothesis with correlation coefficient method and OLS Regression procedure in order to verify if there is a convergence or divergence between political and economic indicators of the Turkish economy, and conclude that the political growth of Turkey on this longstanding path since 1999 lags behind its economic growth.

Contributions of recent studies

The history of analyzing various countries' economic growths dates back far away from the formation of the European Union. Since, the European integration paved way to a new era by putting down some certain criteria for candidate countries to accomplish in order to open a gate for the EU. Two foremost priorities are the economic and political adjustments of candidate countries to the Union's criteria. The adjustments are evaluated through measuring how much economic and political progress candidates achieved since their first application to the Union. Various studies have been done to analyze the economic progress of Turkey, while fewer studies have focused on the political progress as a comparison.

It is a reality that Turkey has never been a permanent "Calm Waters" country on economic perspective. The temporary economic shocks or crisis have always affected the country either directly or indirectly in different periods. However, Turkey has always pulled off itself from the economic turbulences at the end. Most of the studies on economic growth and the economic situation of Turkey have been done during those periods. For instance, Ay and Karaçor (2006) studied the period right after the 2001 economic crisis and the economic growth of Turkey during this period. Through analyzing the sources of the economic growth, they examined the problems and dynamics of Turkish economy and how a good growth might be achieved in this environment. The analysis of Turkish economic growth within the historical process between 1930s and 2001 showed what sort of changes occurred in Turkish economy with the shift to a multi-party system during 1946 and how the economic policies

until 1990s affected the economic growth. Ay and Karaçor also studied the reasons for Turkish economic regression after 1990s and evaluated the new economic program right after the 2000 and 2001 economic crisis. They have figured out the macroeconomic progress in Turkey through analyzing data as GNP growth, GNP per capita, the Consumer Price Index, the unemployment rates, the budget deficit ratio, and the current account balance. The growth numbers related to GNP between years 2001-2006 and the sources of this growth were analyzed, and the political instability and the high inflation rates were figured out to be the basic obstacles in front of the long term sustainable economic growth in Turkey. The study also questioned why the economic growth after 2001 crisis does not create employment, and concluded that even if the economic growth is real in the country, there is still a need for some structural reforms to come over the remaining obstacles. This study is correlated with our paper as long as it analyzes the period right after 2000-2001 which coincides with the phase that Turkey's candidate status started.

A similar study has been conducted by Ergüneş (2009) to analyze the finance of the real economy and the dynamics of the change after the 2001 crisis. The study concentrated on the outcomes of the inflation targeting program, conducted right after the 2000-2001 crisis, on the economy. Similarly, Ay and Karaçor (2006) also focused on indicators as GNP ratio, unemployment rate, inflation rate, CPI. Ergüneş (2009) took additional parameters in her research such as the ratios of imports and exports in the GNP, the Central Bank reserves, short and long term GDP percentages, the change in the import and export between the years 2000-2007, the production growth between the years 2000-2007, the wages and the efficiency correlation, and external debts. Even if one part of her research focuses on the changes in the banking sector, this paper is interested only in the first part of Ergüneş's (2009) research, which is directly interrelated with our economic research parameters.

Another research based on the economic growth and future expectations for Turkey has been conducted by Susam and Bakkal (2008), who analyzed the effect of crisis on macroeconomic variables and 2009 National Budget Figures. The research figured out that Turkey experiencing an extensive economic crisis during 2000s has achieved a stable environment due to the tight monetary and fiscal policies applied right after the crisis term. After analyzing the crisis term and its effects, the research has focused on the possible macroeconomic variables and budget growths of Turkish economy in 2009. The years 2002-2009 are focused on while analyzing the GNP growth rates in Turkish economy. The current account balances, the unemployment rates in Turkish economy, 2009 budget growth expectations have been analyzed and the future predictions have been made for each macroeconomic variable. It has been stated that Turkey has been able to finance its growing

external debt due to the strict “high interest rate-low exchange rate policy” and tight policies followed in the post 2001 crisis term. Besides this, the research also pointed out that in 2009 a decline in the growth and an increase in the unemployment is expected for Turkey, which in turn will also decrease the demand for export goods. The research also stated that in order to revive the demand, Turkey should follow strong fiscal policies, apply tax reductions, and decrease the petroleum costs to create a positive effect on the growth through decreasing the production costs.

As long as corruption is one of the strongest indicators for a world economy, it should also be analyzed in this paper as a macroeconomic variable in measuring economic progress. A contributing study comes from Aidt (2009), who have researched the correlation between corruption, institutions and economic development. The research analyzed whether corruption, which is the sale of a government property for private gain, is an obstacle for development or a fostering effect for it. The research examined the relationship between corruption and economic development both at the micro and macro level, and pointed out that even if in a narrow sense corruption might be seen as greasing the wheels; in a broader sense, it sands the wheels and must be considered as an obstacle for growth. It is a reality that corruption is somehow strongly interrelated with political growth within a country as long as better developed countries are expected to have less corruption. The study mentioned a similar point through stating that in societies with otherwise good governance and strong political institutions, corruption reduces growth. The research concluded that, attention should be shifted to the questions as what role economic, political and legal institutions play in promoting wealth and sustainable development. This paper will contribute to Aidt's research as long as it will find out both the political and economic growth in Turkey, and thus might be a supporting thesis for his argument that political growth has a positive correlation with economic growth even if it lags behind in economic growth rate.

As long as democratization is one of the most crucial elements of political structures, another long term argument is the question whether democratization fosters economic growth. Fidrmuc (2003) studied whether democratization has a positive effect on growth during the post-communist transition, and concluded that even if the early introduction of democracy seems to be harmful for economic growth, democracy still reinforces economic progress through facilitating economic liberalization and thus in turn improves growth. Krueger and Ciolko (1998) and Heybey and Murrel (1999) see liberalization index as endogenous in economic performance and growth as long as countries with economically favorable performance find it easier to apply costly and unpopular reforms. The research used the OLS method for measuring both the relationship between liberalization and growth, and democratization and growth, and it is the

same method that this paper will use to compare the economic and political growth of Turkey. The liberalization and democratization indexes are among the two variables that this paper will use to measure the political growth of Turkey.

As Bac (2005) stated in her research, the European Union has played the crucial role in stimulating the political change in post World War II Europe. The research contributes to our paper through analyzing the political reforms in Turkey towards the EU membership where democratization is the key for attaining candidacy status.

A complementary research has come from Ferreira and Kühl (2009) who have analyzed the role that political institutions with diverge structures within a country have on economic development and growth. They have mentioned in their research that while different set of institutions may economically perform similarly, similar institutions may perform differently, but indeed, they all have a decisive influence in economic decisions such as investment, production and allocation of resources. The research concluded that political institutions, as substitutes for democracy, have an important role in fostering economic growth. This paper will find out what sort of a similar progress does Turkey have in economic and political growths on the way towards EU membership.

After analyzing the recent studies contributing to this research paper, the next part will cover the expected basic conditions for the candidate countries, Turkey's past performance since 2000 and its current position on the way towards full membership through the analysis of 2000, 2008 and 2009 Progress Reports of the Commission on Turkey.

The standpoint for Turkey

It is a reality that a country can not alone achieve being part of such a complex Union full of rules, regulations and laws which regulate the basic standards for candidates. The regular evaluation of candidates on this long path full of road bends is crucial in order to facilitate their jobs and to smooth the way for them. Progress reports just enter the scene at this point and provide regular reports about the analysis of each candidate's progress towards full membership. The European Council of Cardiff in 1998 has first welcomed the idea that the Commission would regularly prepare reports on candidate countries. The first report on Turkey has been prepared in October 1998 to describe the relations between Turkey and the EU, to analyze the situation in both economic and political criteria set by the 1993 Copenhagen European Council, and to analyze Turkey's administrative capacity to assume the obligations of membership-the *acquis*, the legislations, and the policies of the Union. Before analyzing the Progress Reports, this part first briefly introduces the preconditions for full membership of a candidate country.

The “Acquis Communautaire” and the Copenhagen criteria

As long as even being a member of a group necessitates sharing some unique group attributes, being a full member of such a Union requires not only having just simple common properties, but also adopting your country's legislations and laws in line with the complete Union law and regulations. What are those rules and regulations?

The “EU acquis” encompasses all the laws and regulations that the candidate countries should be in line with, and the Copenhagen Criteria determined with the 1993 Maastricht Treaty addresses the political and economic criteria for the candidates to become full members. Whereas the political criteria requires the stability of institutions guaranteeing democracy, the rule of law, human rights and respect for protection of minorities, the economic criteria encompasses having a well functioning market economy and the capacity to cope with competitive pressure and market forces within the Union. The regular progress reports tried to analyze Turkey from all these aspects and drew a road map for the country each year based upon the past performance.

From 1999 to 2009: Progress Reports of 1999/2000 and 2008/2009ⁱⁱ

Perhaps the 1999 and 2000 reports were among the worst reports that have been prepared by the Commission on Turkey since Turkey lacks most of the required attributes. The reports briefly describe the relations between Turkey and the EU, analyses the situation in Turkey in terms of the political and economic criteria for membership, reviews Turkey's capacity to assume the *acquis*, on the basis of evaluating the previous year.

The 1999 and 2000 reports addressed the serious shortcomings in terms of human rights and protection of minorities, the widespread torture and restriction of freedom of expression in the country. It has been indicated that the National Security Council continues to play a major role in political life, and despite some improvements in the democratization process such as the adoption of some key laws regulating the political life, the justice system and protection of human rights, the political criteria was not full achieved during the initial steps of accession candidacy.

Since, the economic criteria also lagged behind the *acquis*. One of the best representing signals was the high increase in the unemployment rate in Turkey after the economic slowdown of 1998 and 1999. The report figured out with reference to an ILO compatible survey that the unemployment rate which was 7.3% in 1999 rose up to 8.3% in the first quarter of 2000. The huge differences between urban areas with more than 10% unemployment rate and the rural areas with 5% unemployment rate

reflect the imbalance between different parts of the country. Besides these shortcomings, some improvements could also be achieved in terms of providing fewer restrictions on market entry and exit during 1998-2000. For instance, the report figured out that about 27 500 new enterprises were established during the first half of 1999, and 8300 enterprises liquidated. In addition, for the first time since the beginning of Turkish privatization process, the government of those years had achieved significant results. The sale of the 51% stake of the petrol distributor Poaş and the public offering of the oil refinery Tüpraş are among the best examples of the privatization initiatives. All those efforts show out that Turkey started to achieve a substantial progress in macroeconomic stability, yet without being fully completed. Turkish economy was told to be in the process of achieving a functioning market economy, but there was a need for sustainable public finances, and improvements in manufacturing and financial sector where state dominance remains.

When a country starts walking in this long path, each passing year adds certain amount of value to the progress process of that candidate country. Turkey has achieved significant steps in this long and complex adoption process between the years of 1999-2009, the long lasting 10 years. The progress reports of 2008 and specifically 2009 years clearly reflect this shift.

The 2008 report figured out that negotiations were opened between Turkey and the EU on eight chapters including Enterprise and industry, Statistics, Financial Control, Trans-European Networks, Consumer and Health Protection, Intellectual property law, Company law. The enhanced political dialogue between the EU and Turkey has continued with the regular meetings held in May and September 2008 at ministerial level and in February and July 2008 at political director level. The meetings not only discuss certain issues that Turkey faces struggles in the adoption of *acquis*, but also discuss foreign policy issues related to regional areas of common interest to the EU and Turkey, such as Iraq, Iran, the Middle East and the Caucasus. One of the best signals that Turkey is day by day becoming a much more economically competitive country is that, Turkey in the report was shown as the EU's seventh trading partner due to the Customs Union. The EU asked Turkey to remove all remaining restrictions on the free movement of goods, including restrictions on means of transport regarding Cyprus.

Limited development could be realized in 2008 concerning the ratification of human rights instruments. While, the Optional Protocol to the UN Convention against Torture (OPCAT), signed in September 2005 has not been ratified, the ratification of the UN Convention on the Rights of Persons with Disabilities was also pending. Turkey has not ratified three additional Protocols to the European Convention on Human Rights (ECHR) and it has been reported in the progress report that the 266 judgments were made finding that Turkey had violated the ECHR. It has also reflected that the applications to the European Court of Human Rights also continued to

increase, with 3,705 applications during the reporting period. The majority of these new applications concerned the right to a fair trial and protection of property rights. Concerns about the independence of the judicial system of Turkey also remain.

Another indicator concerning the political criteria is the *freedom of expression* which is a foremost priority for the Union. Even if many amendments to Article 301 of the Turkish Criminal Code with the intention of strengthening the safeguards for freedom of expression were made, the report showed that there were still concerning issues about the concept. The legal framework for *freedom of assembly* is broadly in line with European standards.

Concerning gender equality, children's and women's rights inequality still existed in 2008. According to official statistics, participation by women in the labour force is not only low (24.8 % in 2007) but also on a decreasing trend, and according to the report, the rate of women's employment and political representation of women at both national and regional levels is the lowest among the EU Member States. Regarding children, there is still a shortcoming in the number of child courts and an increase in the number of child being imprisoned. There was still a need for an improvement regarding the disabled people, and the issues regarding education and property rights of the minorities still seemed to be unsolved.

A number of issues regarding the reform of public administration still remained to be addressed, such as reducing administrative burden, ensuring simplification, establishing regulatory impact assessments (RIA), developing administrative procedures, enhancing transparency and improving policymaking and coordination systems.

The armed forces seemed to continue to exercise significant political influence through formal and informal mechanisms. Since no change has been made to the Turkish Armed Forces Internal Service Law and the Law on the National Security Council, the military still has a wide room for maneuver and the right to explain their views in national and foreign policy issues.

Despite its expression of commitment to the EU accession process and to political reforms, the government did not put forward a consistent and comprehensive program of political reforms. The government did not prepare a comprehensive anti-corruption strategy and thus corruption was reported to be a continuous problem within the country. On the other hand, the new president had played a conciliatory role between political actors and civil society through establishing a good working relationship with the government, and through playing an active role in foreign policy.

Concerning the economic criteria, Turkey broadly implemented the economic policy agreed with the Commission and with international financial institutions and successfully completed the stand-by arrangement with the International Monetary Fund (IMF) in May 2008. The 2008 report indicated that despite the slowed down

economic growth due to the weakness of total demand, the global market uncertainty and changes in internal politics, the main structure of Turkish economy has strengthened compared to previous years. Turkey was told to be able to finance its current account deficit, and the impact of the 2008 fiscal fluctuations all around the world seemed to be limited in Turkey and Turkish Banks. While the unemployment rate was between 10 and 11%, the inflation rates did not cross the targeted limits of 8.4% at the end of 2007 and 10.6% during the mid 2008. The privatization process has continued with Petkim, İzmir Port, TEKEL and Turk Telekom are among the most significant privatization steps. The financial growth has continued with 18% between 2007 and 2008, and the banking sector also grew by 26%. The Central Bank made significant efforts to monitor developments in the financial sector more closely. While transparency in the corporate sector has improved and accounting standards have been upgraded, the report addressed specific attention to be made to Turkish Commercial Code.

SMEs account for 99% of all enterprises in Turkey and 77% of total employment, which is a good signal reflecting the improvements in market entry. State intervention continues to influence competition and competitiveness considerably, although the State's role on the markets is being further reduced.

The 2009 report is among the best of all the previous reports as long as crucial steps have been achieved during this year both in economic and political terms. Even if there are still areas where there are shortcomings of Turkey, it is an undeniable fact that Turkey achieved a long run in this EU harmonization process. The 2009 report once again confirmed Turkey as the EU's seventh largest trading partner similar to the 2008 report. Furthermore, this report has some strength compared to the previous one. First of all, despite the eight chapters opened in 2008, negotiations have been opened on eleven chapters. As the report states, the December 2006 Council Decision still remains setting out that negotiations will not be opened in eight chapters relevant to Turkey's restriction regarding the Republic of Cyprus, and no chapters will be closed until the Commission confirms that Turkey has fully implemented the Additional Protocol to the Association Agreement.

The enhanced political dialogue between Turkey and the EU has continued with the meetings held at ministerial level and political director levelⁱⁱⁱ, discussing the basic challenges that Turkey face in terms of Copenhagen political criteria, revising foreign policy issues of common interest such as Iraq, Iran, the Middle East and the Caucasus.

In addition, the Instrument for Pre-Accession Assistance (IPA) provided Turkey with a financial assistance of 567 million Euros in 2009 focusing the support on institutions directly concerned by political reforms in the judiciary and the law enforcement services, on the adoption and the implementation of *acquis communautaire* in priority areas,

on economic and social development, and on rural development.

Turkey, regarding the political criteria, as mentioned in the above sections, might be evaluated in three parts such as democracy and the rule of law, human rights and protection of minorities, and regional issues and international obligations. Even if the required improvement for Turkey is not yet enough, it will not be totally wrong to claim that Turkey achieved important steps. The democracy and rule of law may mainly be analyzed in terms of Constitution, Parliament, Government, Public Administration, Judicial System, and Anti-corruption policy. The continued investigations into the alleged criminal network Ergenekon, and the case for closing the Democratic Society Party led to serious criminal charges by giving a chance for Turkey to strengthen true functioning of its political institutions. But the report states that Turkey still needs to bring its legislation on political parties in line with EU standards. For instance, no consensus has yet been reached on constitutional reform, which would allow further democratized in many areas and give a stronger guarantee of fundamental freedoms in line with European standards.^{iv} In addition, even if the *Parliament* establishes a consultative Committee on Equal Opportunities for Men and Women, there is still a necessity for improving parliament's rules of procedure. Besides the positive supporting efforts of the reshuffled *Government* that expressed strong commitment to the EU accession process and political reforms, no progress has been made on devolution of powers to local governments. The adoption of the National Program in 2008 for the adoption of the *acquis* (NPAA)^v and the decision to appoint a Chief Negotiator are considered to be an important step, but there is a shortcoming as there is little progress in effective implementation of political and constitutional reforms. Turkey is still expected to improve democratic governance mechanisms, and establish operational city councils which will in turn pave the way for enhancing public participation in local governments.

The *public administration* is another area that lacks considerable amount of progress as long as Turkey should still take certain actions to modernize the civil service, reducing red tape and promoting administrative simplification based on transparency, accountability and independency. Even if the government approved the judicial reform strategy in August 2009, concerns still remain about the independence, impartiality and efficiency of the *judiciary* such as the composition of the High Council of Judges and Prosecutors, and the establishment of the regional courts in appeal. Since, even if a legislative framework is designed to prevent *corruption*, it is a reality that Turkey is still suffering from corruption in many areas. Thus, finalizing an anti-corruption strategy is what the EU expects from the candidate country.

Human rights and protection of minorities is the second

point in political criteria for the candidates. Whereas some progress is held in this area, there is still a need for some legislative amendments such as establishing an independent human rights institution and an Ombudsman to strengthen the institutional framework. Yet, allegations of torture and ill-treatment are great concerns even if Turkish legal framework includes some set of safeguards against torture. However, revision of the article 301 of the Turkish Criminal Code (entering into force in May 2008) was an undeniable step as long as it is not systematically used anymore to restrict *freedom of expression*. Thus, there is a considerable amount of decline in prosecutions compared with previous years.^{vi} But, there are several other articles needed to be amended as long as they lead to many other prosecutions and convictions, and the political pressures on media still exist affecting their freedom of press. For Turkish law to be in line with ECHR and sufficiently guarantee the freedom of expression, Turkey should make some more legal arrangements.

The increase in the number of associations and their membership is a good symbol of *freedom of association*. Regarding freedom of association, the peacefully settled Newroz and 1 May demonstrations may be said to positive outcomes of the EU harmonization process; however demonstrations in the South-east witnessed violence. Thus, even if the legal framework on associations seems to be in line with EU standards, progress is required in its implementation especially in critical areas.

Regarding the *freedom of religion*, the implementation of law on foundations worked out smoothly, but the specific problems of Alevi and non-Muslim religious communities need to be addressed, and the legal framework should be in a way to guarantee that all communities can function equally without undue constraints, such as training of clergy. Whereas, the decline in the gender gap in primary education^{vii} and the increase in the number of child courts^{viii} were positive steps as regards children's rights; there are still shortcomings such as regional disparities in primary school enrollment, an increase in the poverty rate of children under 15 years of age^{ix}, and lack of success in combating child labor. Thus, efforts should be continued in administrative capacity, health, education, and child labor. There are no sufficient data on disabled people and mentally ill people. As people with disabilities still face huge problems in gaining access to services due to physical barriers, a considerable amount of effort should be realized in order to improve this area.

Perhaps, *minority rights* is among the most critical and sensitive topics that Turkey is approaching restrictively. The report states that Turkey has a limited effort in providing full respect for and protection of language, culture and fundamental rights in line with EU standards. It would be wrong to underestimate the steps such as the starting of the operation of channel TRT-6 broadcasting in Kurdish 24 h a day, and the initiative of establishing a

“Living Languages Institute” which would provide post graduate education in Kurdish and other languages in the country. There are criminal convictions against DTP members for using Kurdish language in political life.

Regarding the final point of political criteria, regional issues and international obligations, it is a fact that the Cyprus issue is the key conflict area between EU and Turkey as long as there is no progress in normalizing the relations. Turkey is still keeping its ports closed to the vessels from the Republic of Cyprus and still vetoing Cyprus's membership of several international organizations and several international arrangements such as the Wassenaar Agreement on the Code of Conduct on Arms Exports and on Dual-Use Goods. The full, non-discriminatory implementation of the Additional Protocol and the removal of all obstacles to the free movement of goods, including restrictions on means of transport to all EU Member States are expected from Turkey^x. Thus, since Cyprus is still out of this full implementation, even if bilateral relations with other enlargement countries and neighboring member states including Western Balkans and Bulgaria have been developing positively, there is still some way for Turkey to take in case of Cyprus.

The economic progress of Turkey seems to be much better compared to the political one. Even under challenging circumstances such as the economic crisis affecting the whole world, the 2009 progress report shows that consensus on economic policy essentials has been preserved due to better planning, coordination and communication. Besides the negative effects of the global crisis, the economic indicators figured out that the peak economic values in the first quarter of 2009 calmed down in the mid-2009. The report supports that Turkish economy has contracted sharply as a result of the outbreak of the global crisis, but despite these facts, Turkish economy could cover up especially in the second half of 2009. As a result of the drop in both domestic and external demand, the unemployment rate rose sharply from 9.5% in mid-2008 to 13% by mid-2009 and labor market conditions become much more challenging as the employment rate also fell down by 1 percentage according to the report, catching up 42.5% by June 2009. Besides, while the downward trend in industrial production began to slow down in March 2009, consumer and business confidence started to increase and capacity utilization in the sector started to show positive signals. In addition, female employment also started to rise in 2008 but by June 2009 it was still less than 24% of total working-age population which might be said to be low. At the same time, the report states that external imbalances were also reduced significantly and access to external finance remained open for both public and private sectors. The annual inflation rate which fell down to 5.3% in August 2009 from 11.8% in 2008, and the significant improvement in the price stability despite the considerable depreciation of Turkish lira were also positive signals in the macro-economic stability. It has been stated that there are still shortcomings in providing accountability, efficiency, and

transparency of the budgeting process, such as the example of the lack of the implementation of the unification of all tax administration functions under the Revenue Administration. Due to the strong stabilization policy followed by Turkey in the past several years, Turkish economy had benefited from in-depth structural reforms in several key areas such as banking, enterprise restructuring and privatization, education and energy. But even according to the report, *macroeconomic stability* is still vulnerable in the absence of stronger fiscal anchors.

Regarding market entry and exit, there are still long licensing procedures remaining as an obstacle in market exit. Even if the adoption of new legislation facilitated market entry, sectoral restrictions on foreign ownership continued to exist in areas such as maritime transport, civil aviation, ground handling, radio and TV broadcasting, energy, education and road transport. As a result of earlier reforms of regulatory and supervisory frameworks, the financial sector remained silence even under challenging crisis situations. The banking sector with the increased share from 70 to 77% was a good signal of this. But, the capital adequacy ratio of 18% was higher than the EU legal requirement of 12%.

The capacity to cope with competitive pressures and market forces within the Union is another economic criterion that the EU considers. The report figured out that despite the economic recession, the macroeconomic stability has been broadly preserved and Turkey continues to be a functioning market economy even if there were some uncertainties due to the business environment. It has been stated that some progress was made in developing the human and physical capital of the country and the signature of the Nabucco natural gas intergovernmental agreement was a crucial economic and strategic development. It is a shortcoming for Turkey as there is still state intervention on competition which leads to lack of transparency and thus affects competition and competitiveness in a negative manner. This is the economic integration with the EU continues as trade with EU remains high. Even if there was a decline in the EU shares of export most probably due to the global economic crisis, Turkey had the chance to become less dependent on the EU and to diversify its trade towards neighboring countries of east and south.^{xi} In addition, imports also rose by only 9% from EU whereas imports from other countries rose by 25%. Since, as the reports states, there is a strong interdependence between EU and Turkey as the FDI inflows to Turkey from EU members rose up to 88% in 2009 from 75% in 2008. The next part will make the graphical analysis of economic and political indicators using the available data between 2000-2009.

Analysis of economic and political indicators in Turkey

This part will briefly analyze the data available on

Table 1. Developments in basic macroeconomic indicators in Turkey (1999-2009).

Yrs	Growth Rate (%)	CPI(%)	GDP Per Capita(\$)	Budget Deficit/GNP (%)	General Government Debt Stock/GDP (%)
1999	-3,4	68,8	2879	-11,7	
2000	6,8	39	2965	-10,6	
2001	-5,7	68,5	2123	-16,5	77,6
2002	6,2	29,7	3492	-11,4	73,7
2003	5,3	18,4	4559	-8,8	67,4
2004	9,4	9,3	5764	-5,2	59,2
2005	8,4	7,72	7021	-1,1	52,3
2006	6,9	9,65	7583	-0,6	46,1
2007	4,7	8,39	9234	-1,6	39,4
2008	0,9	10,06	10436	-1,8	39,5
2009 (GT)	-6,0	6,53	8456	-5,5	47,3

Source: Hazine, T.C. Central Bank.

economic and political indicators on Turkey in order to check out whether there is a convergence between economic and political developments on the way towards full membership since 2000.

Transformation of Turkish economy from the EU perspective

The size of the Turkish economy is approximately about 2.3% of the EU-15 and about half of the ten new members that achieved full membership in 2004. According to the purchasing power parity, the average Gross National Product (GNP) per capita in Turkey is much below the average of the ten new members^{xii}, but shows similarity with the average of the two members, Bulgaria and Romania which entered in 2007. The average purchasing power parity per capita in Turkey is approximately 25% of the EU-15. Turkey's population is approximately 5 million less than the total population of the 10 new members.

In order to make a comparative analysis regarding Turkey's integration process with the EU, there is an evolution of the macroeconomic indicators in Turkey between years of 1999-2009 (Table 1).

The indicators in Table 1 are the conditions of the Maastricht criteria required for the Union members to be able to become a part of the Monetary Union. These criteria at the same time aim at providing the necessary convergence among member states which will be in accordance with the aim of turning the economic and monetary union into a political one. As mentioned deeply in the previous parts, democracy, rule of law, existence of institutions guaranteeing respect for human and minority rights are the political criteria while a well functioning market economy, ability to cope with competitive pressures and market forces within the Union are the economic criteria. Thus, these indicators are taken as

the basic data for our analysis. The Copenhagen Summit also referred the economic criteria as the real convergence criteria. With the realization of those criteria, the convergence of market functioning and national income per capita of the candidate countries and the EU member countries are achieved (Us, 2007).

Before analyzing Turkish economy according to the Maastricht criteria, below, there is the growth process of the recent period. With the effect of global economic crisis, the Turkish economy, especially in the first half of 2009, has experienced a serious recession as a result of the decrease in the domestic and foreign demand. Turkish economy which was in a growth phase after 2002 has entered into a contraction period (Figure 1).

Based on macroeconomic indicators of inflation, long term interest rates, government debt stock, Table 2 shows the analysis of comparison of Turkey and the new EU members by 2009. According to these criteria, the difference between the average of annual inflation rates of the three countries with the best performance of price stability and the inflation rate of a member country should not pass 1.5 points, the ratio of public deficits of the member states to GDP should not pass 3%, the ratio of the public debts of member states to the GDP should not pass 60%, and a currency of a member state should not be devalued against another member's currency for the recent two years.

Regarding the indicators in the table, one may say that Turkey is around the reference indicators except the two convergence criteria of inflation and long term interest rates. In the following part, you may find the comparison analysis of economic and political convergence criteria between Turkey and average of EU-27 members (Figure 2).

Since 2003, the inflation in Turkey, which was in a decreasing trend during 2000s, has shown a consistent flow with one digit numbers. Regarding the inflation indicators, besides the fact that the reference value could not be caught up, it might be said that Turkey is

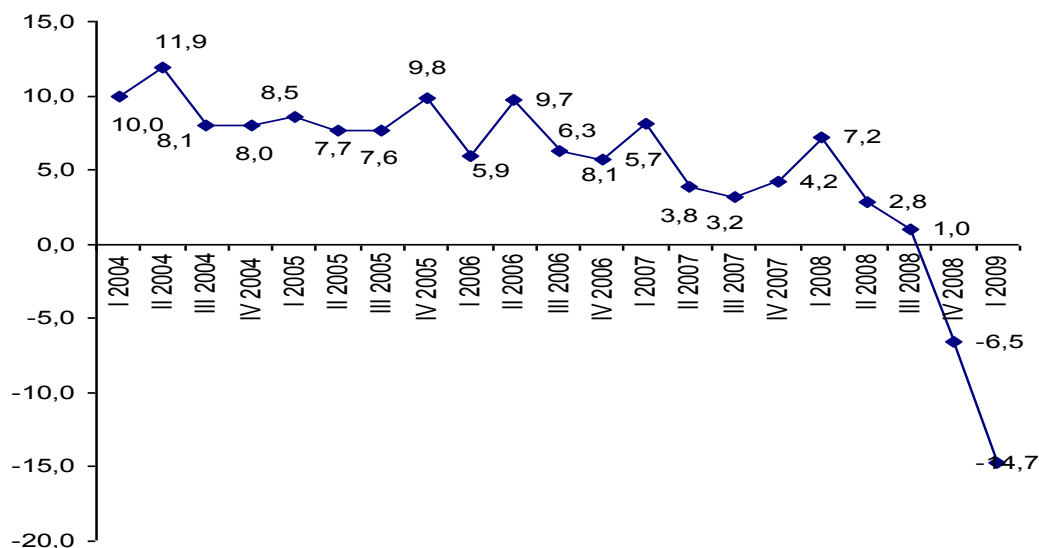


Figure 1. Periodical GDP Growth Rate (%).

Table 2. Maastricht convergence criteria (Year 2009).

Countries	(Inflation Rate)	Governmnet Debt Req./ GDP (Current Prices)	(Total Debt Stock/GDP)	Long Term Interest Rate
Bulgaria	2.5	1.8	14.1	6.75
Czech Republic	0.6	-2.1	30.0	4.87
Estonia	0.2	-2.7	4.6	4,50
Cyprus	0.2	0.9	48.4	4.51
Latvia	3.3	-4.1	19.5	15.50
Lithuania	4.2	-3.2	15.6	4.58
Hungary	4.0	-3.8	72.9	9.11
Malta	1.8	-4.7	63.8	4.73
Poland	4.0	-3.6	47.2	6.13
Romania	5.6	-5.5	13.6	--
Slovenia	0.9	-1.8	22.5	4.37
Slovakia	0.9	-2.3	27.7	4.72
Turkey	6.3	-2.2	39.5	12.2
Reference Other	2.53	-3.0	60.0	5.22

Note: The long terms interest rates for Turkey are taken from OECD, Main Economic Indicators data base. The data belongs to 2007.

approaching the EU in terms of inflation values.

Regarding the General Gross Public Debt Stock, while the ratio of debts stock to the GDP was around high values during 2000s, after 2003 it has been below the average of EU27 (Figure 3).

After 2006, the unemployment rate, which was on an increasing trend since 2000s, has shown a similar tendency to the average of unemployment rate of EU27. The unemployment rate in Turkey is higher than the average unemployment rate in EU27 (Figure 4).

In terms of economic criteria, the Index of Economic

Freedom which has published by Heritage Foundation since 1995 may also be used as a source of evaluation. Together with Wall Street Journal, each year 50 different criteria are used to make an analysis, and 157 countries are ranked according to 10 different factors. These factors are trade policies, the fiscal burden of the government, government intervention to the economy, monetary policy, the capital flows and foreign investment, banking and finance, wages and prices, property rights, regulation and the unrecorded market activities. The Index of Economic Freedom is scored from 0 to 100

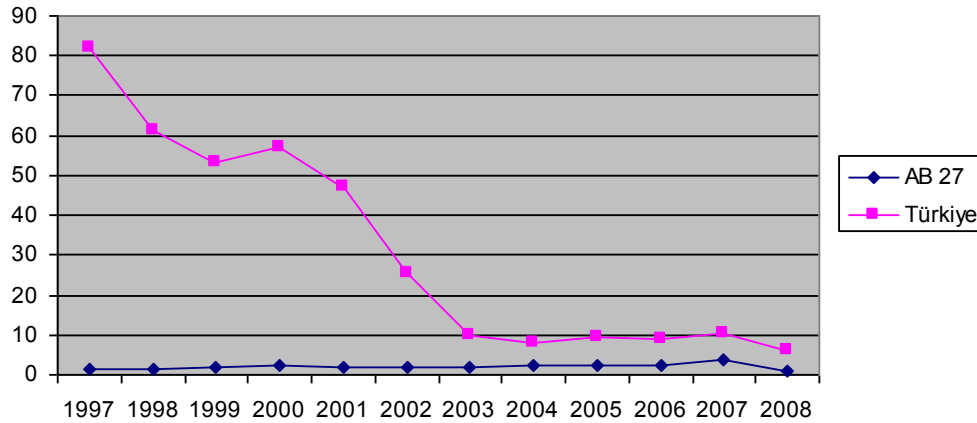


Figure 2. Convergence between EU27 and Turkey in terms of Inflation (CPI).

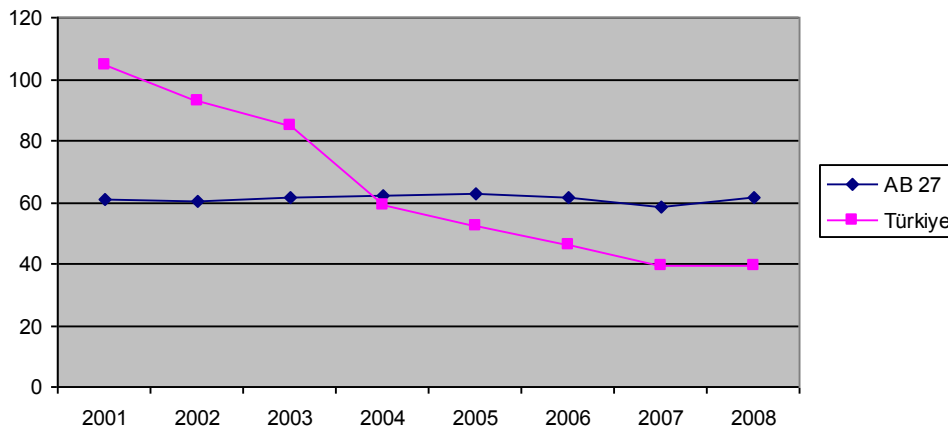


Figure 3. Convergence between EU27 and Turkey in terms of General Gross Public Debt Stock/GDP Ratio.

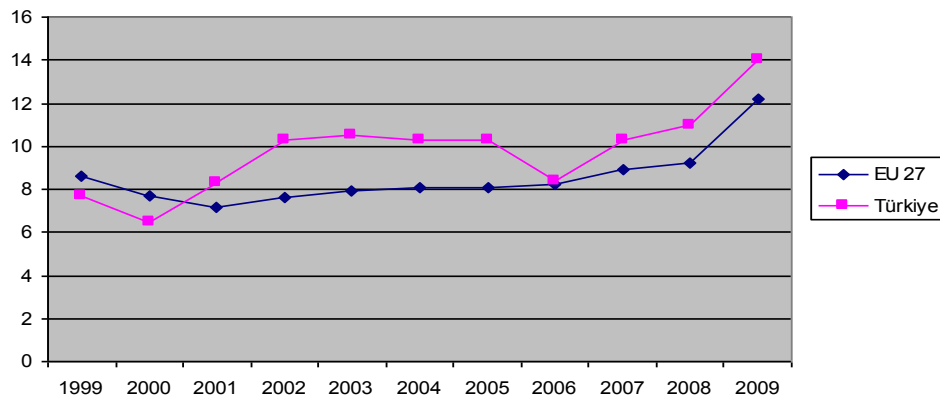


Figure 4. Convergence between EU27 and Turkey in terms of unemployment rate.

points. According to the scores the countries acquire, there are five categories. Countries with scores between 80-100 are categorized as “free”, countries with scores

between 70-79.9 are categorized as “mostly free”, countries with scores between 60-69.9 are categorized as “moderately free”, countries with scores between 50-

Table 3. Heritage Foundation-Wall Street Journal Index of Economic Freedom (1995-2010).

Yrs	Overall Score	Business Freedom	Trade Freedom	Fiscal Freedom	Government Spending
2010	63.8	68.9	86.4	78.1	82.9
2009	61.6	69.9	86.6	73.2	83.4
2008	60.0	68.3	86.8	77.8	68.3
2007	57.4	67.4	81.0	69.1	62.4
2006	57.0	66.7	81.0	68.0	68.1
2005	50.6	55.0	76.0	65.3	54.4
2004	52.8	55.0	74.2	60.8	56.9
2003	51.9	55.0	73.6	64.6	45.0
2002	54.2	55.0	79.6	65.2	58.9
2001	60.6	70.0	73.0	66.9	73.0
2000	63.4	70.0	75.0	67.2	82.7
1999	59.2	70.0	74.4	57.0	57.1
1998	60.9	70.0	73.8	58.4	68.5
1997	60.8	70.0	77.8	57.3	61.8
1996	56.7	85.0	75.0	44.3	57.1
1995	58.4	85.0	74.8	44.5	63.3

Table 3 (cont.).

Years	Monetary Freedom	Investment Freedom	Financial Freedom	Property Rights	Freedom From Corruption	Labor Freedom
2010	70.0	65.0	50.0	50.0	46.0	41.1
2009	71.1	50.0	50.0	50.0	41.0	40.3
2008	70.8	50.0	50.0	50.0	38.0	39.5
2007	70.1	50.0	50.0	50.0	35.0	38.8
2006	64.7	50.0	50.0	50.0	32.0	39.1
2005	53.8	50.0	30.0	50.0	31.0	40.7
2004	46.1	50.0	50.0	50.0	32.0	-
2003	42.9	50.0	50.0	50.0	36.0	-
2002	41.0	50.0	50.0	50.0	38.0	-
2001	36.4	70.0	50.0	70.0	36.0	-
2000	31.8	70.0	70.0	70.0	34.0	-
1999	31.8	70.0	70.0	70.0	32.0	-
1998	31.8	70.0	70.0	70.0	35.0	-
1997	29.8	70.0	70.0	70.0	41.0	-
1996	28.9	70.0	70.0	70.0	10.0	-
1995	38.2	70.0	70.0	70.0	10.0	-

Source: Index of Economic Freedom (1995-2010), Heritage Foundation&Wall Street Journal.

50.9 are categorized as “mostly unfree”, and countries with scores between 0-49.9 are categorized as “repressed”.

The values for Turkey between years 1995-2010 analyzed by the Index of Economic Freedom are given in Table 3.

Turkey, which was categorized in “mostly unfree” countries between years 1995-2007, since 2007, it has been categorized among “moderately free” countries.

Considering that the EU27 average is generally over the score of 70 points, it will not be wrong to state that Turkey needs to improve itself in this area. In Figure 5, scores for Turkey and EU 27 related to only four out of those ten score categories –Business Freedom, Financial Freedom, Property Rights, Freedom from Corruption- between years 1995-2010 are shown in order to check out whether there is a convergence between the two.

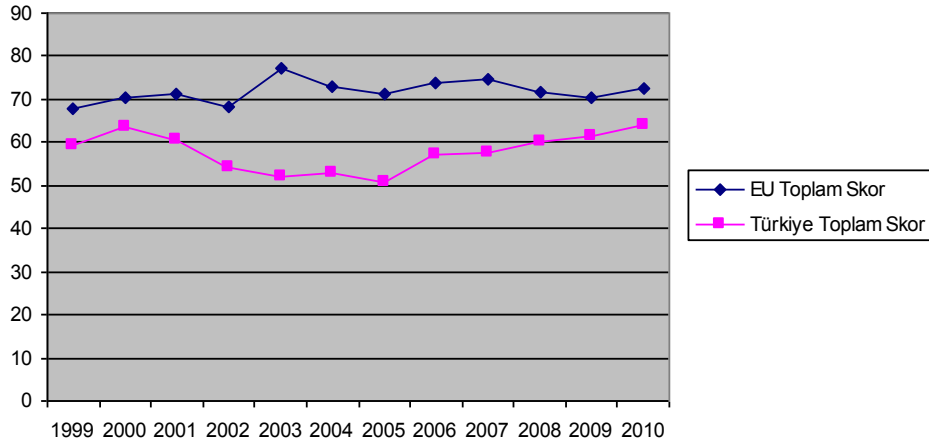


Figure 5. Comparison of Turkey and EU 27 in terms of total score points.

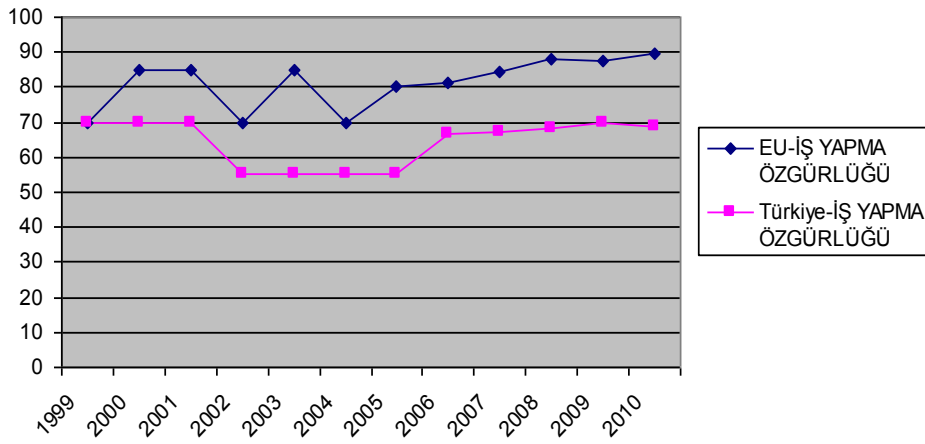


Figure 6. Comparison of Turkey and EU 27 in terms of business freedom.

As seen in the graph, according to the total score, after 2006 there is a convergence between Turkey's total score and the average of EU27 (Figure 6).

Regarding the freedom of business, it might be said that while the divergence increases between the two in certain years, there is a convergence between them in others. According to the 2010 Index of Economic Freedom for Turkey, starting a business takes an average of six days, compared to the world average of 35 days. Obtaining a business license requires more than the global average of 18 procedures but less than the world average of 218 days, and costs are relatively low (Figure 7).

Regarding the Financial Freedom, it can be seen that there is a convergence between the two by the time. Regarding the Property Rights (Figure 8), it is a reality that there is no considerable improvement in Turkey in time and that it lags behind the average of EU27. According to the 2010 Index of Economic Freedom for Turkey, even if property rights are generally enforced,

it has been stated that the courts are overburdened and slow, and judges are not well trained for commercial cases. In addition, the intellectual property rights regime has improved, but protection of confidential pharmaceutical test data is insufficient, and levels of piracy and counterfeiting of copyrighted and trademarked materials are yet high.

Regarding the Freedom from Corruption, the reality attracts attention that there is still a crucial difference between Turkey and the average of EU27, and as 2010 Index of Economic Freedom for Turkey also states, corruption is still significant in Turkey (Figure 9). It might be easily seen from the figure that even if there is an improvement in Turkey as the years pass by, it is far away from the EU27 average. This is most probably due to the continuous improvement of EU27 in terms of freedom from corruption.

The analysis in terms of political criteria will be made according to the political rights and civil rights scores of Freedom House published each year. The political rights

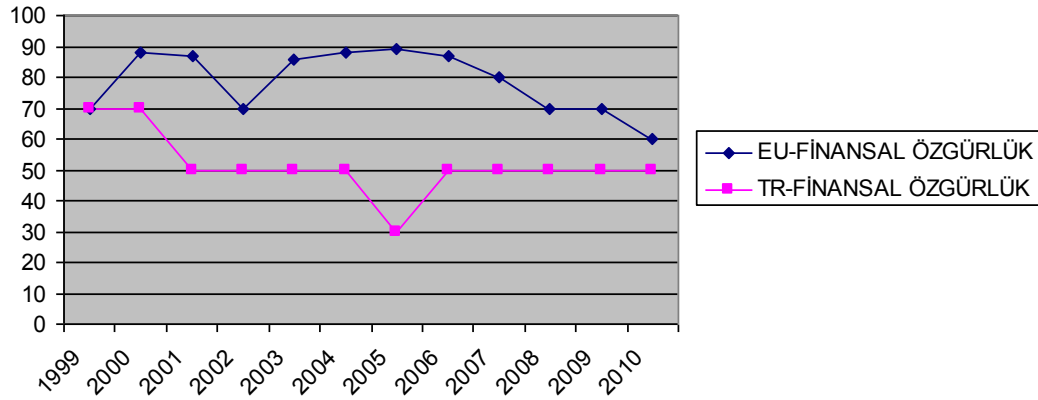


Figure 7. Comparison of Turkey and EU 27 in terms of financial freedom.

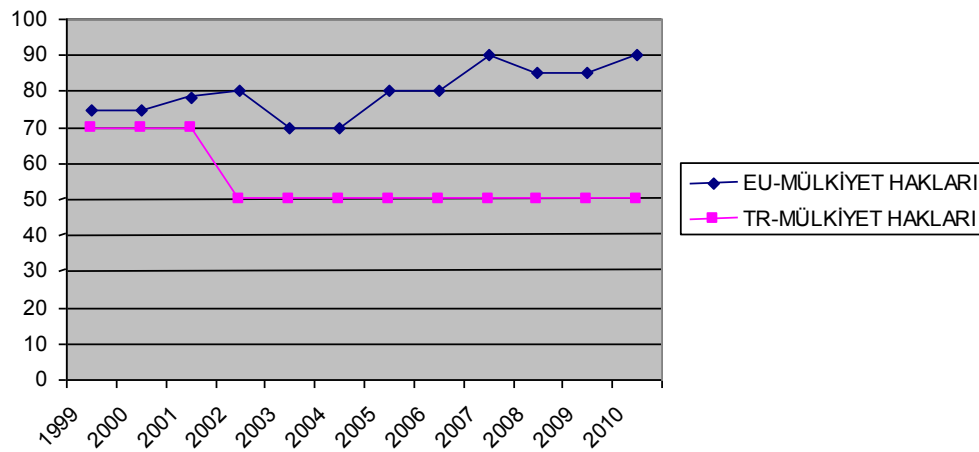


Figure 8. Comparison of Turkey and EU 27 in terms of property rights.

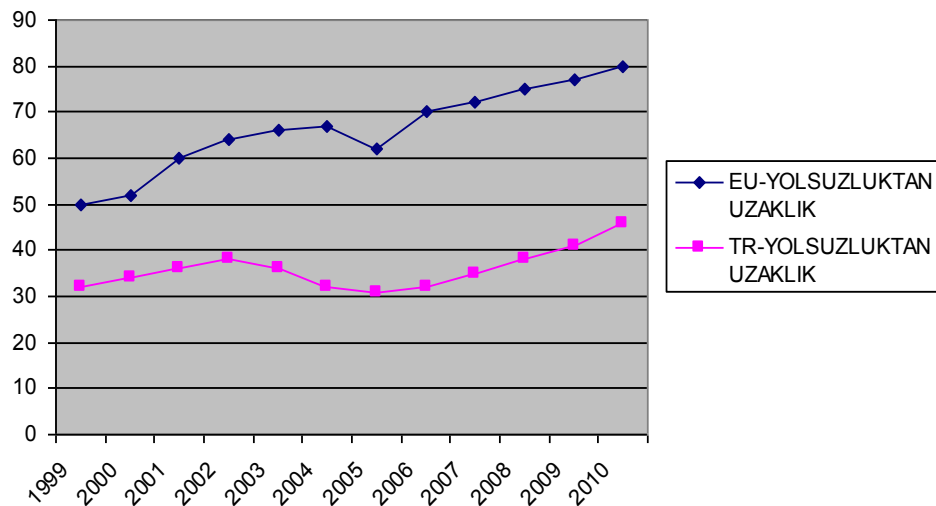


Figure 9. Comparison of Turkey and EU 27 in terms of freedom from corruption.

Table 4. EU27 according to the Political Right Criteria (1999-2009).

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Austria	1	1	1	1	1	1	1	1	1	1	1
Belgium	1	1	1	1	1	1	1	1	1	1	1
Bulgaria	2	2	1	1	1	1	1	1	1	1	2
Cyprus	1	1	1	1	1	1	1	1	1	1	1
Czech Republic	1	1	1	1	1	1	1	1	1	1	1
Denmark	1	1	1	1	1	1	1	1	1	1	1
Estonia	1	1	1	1	1	1	1	1	1	1	1
Finland	1	1	1	1	1	1	1	1	1	1	1
France	1	1	1	1	1	1	1	1	1	1	1
Germany	1	1	1	1	1	1	1	1	1	1	1
Greece	1	1	1	1	1	1	1	1	1	1	1
Hungary	1	1	1	1	1	1	1	1	1	1	1
Ireland	1	1	1	1	1	1	1	1	1	1	1
Italy	1	1	1	1	1	1	1	1	1	1	1
Latvia	1	1	1	1	1	1	1	1	1	1	2
Lithuania	1	1	1	1	1	1	2	1	1	1	1
Luxembourg	1	1	1	1	1	1	1	1	1	1	1
Malta	1	1	1	1	1	1	1	1	1	1	1
Netherlands	1	1	1	1	1	1	1	1	1	1	1
Poland	1	1	1	1	1	1	1	1	1	1	1
Portugal	1	1	1	1	1	1	1	1	1	1	1
Romania	2	2	2	2	2	2	3	2	2	2	2
Slovakia	1	1	1	1	1	1	1	1	1	1	1
Slovenia	1	1	1	1	1	1	1	1	1	1	1
Spain	1	1	1	1	1	1	1	1	1	1	1
Sweden	1	1	1	1	1	1	1	1	1	1	1
United Kingdom	1	1	1	1	1	1	1	1	1	1	1

Source: Freedom House, Freedom in The World:1999-2010 The Annual Survey of Political Rights and Civil Liberties

criteria are fair elections, the right of freedom of election, availability of opposition parties, availability of civil society institutions and their pressures, the participation of minorities into the decision making process. Civil rights criteria, on the other hand, are determined as existence of an independent and free media, a free public and special belief institutions, freedom of meetings and associations, freedom of political institutions, free trade unions, judicial independence, equality before law, the unfair arrest of individuals against the system, freedom of discussion, freedom of work, and gender equality.

According to Freedom House, based on political freedom countries are aligned as “free”, “moderately free”, “not free”. The score points are given between 1 to 7 and countries with scores between 1-2.5 are evaluated as “free”, while countries with scores between 3-5.5 are evaluated as “moderately free”, and countries with scores between 5.5-7 are evaluated as “not free” (Tables 4-6). According to the political rights criteria, all EU27 countries are evaluated as “free”. Except Bulgaria, all other member countries acquired “1” point. In this manner, Turkey’s

score which was 4 during 1999-2001 increased to 3 points after 2001, but still the status and range of “moderately free” remained unchanged. It might be understood clearly that as a candidate country, Turkey is behind the EU members in terms of political rights. The same situation is valid for civil liberties as long as regarding those, Turkey, which was in a status of a “not free” country between years 1999-2001, after 2001 it was categorized as “moderately free” country.

The final criterion that will be analyzed according to political criteria is the judicial case transferred to the ECHR. Tables 7 and 8 clearly show that Turkey is the highest rate country which is in violation with the ECHR decisions. Table 7 shows that Turkey, with number 2017, is the country with the highest rate of judgments finding at least one violation between years 1959-2009. With a focus on year 2009, Table 8 also shows the fact that Turkey is still the highest rate country with 341 judgments finding at least one violation. Figures 10 and 11 clearly point out that in Turkey, 86% of judgments are in violation. Figure 12 shows the continuous increase in the number

Table 5. EU27 according to the Civil Liberties (1999-2009).

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Austria	1	1	1	1	1	1	1	1	1	1	1
Belgium	2	2	2	2	1	1	1	1	1	1	1
Bulgaria	3	3	3	2	2	2	2	2	2	2	2
Cyprus	1	1	1	1	1	1	1	1	1	1	1
Czech Republic	2	2	2	2	2	1	1	1	1	1	1
Denmark	1	1	1	1	1	1	1	1	1	1	1
Estonia	2	2	2	2	2	1	1	1	1	1	1
Finland	1	1	1	1	1	1	1	1	1	1	1
France	2	2	2	2	1	1	1	1	1	1	1
Germany	2	2	2	2	1	1	1	1	1	1	1
Greece	3	3	3	3	2	2	2	2	2	2	2
Hungary	2	2	2	2	2	1	1	1	1	1	1
Ireland	1	1	1	1	1	1	1	1	1	1	1
Italy	2	2	2	1	1	1	1	1	1	1	2
Latvia	2	2	2	2	2	2	1	1	1	1	1
Lithuania	2	2	2	2	2	2	2	1	1	1	1
Luxembourg	1	1	1	1	1	1	1	1	1	1	1
Malta	1	1	1	1	1	1	1	1	1	1	1
Netherlands	1	1	1	1	1	1	1	1	1	1	1
Poland	2	2	2	2	2	1	1	1	1	1	1
Portugal	1	1	1	1	1	1	1	1	1	1	1
Romania	2	2	2	2	2	2	2	2	2	2	2
Slovakia	2	2	2	2	2	2	1	1	1	1	1
Slovenia	2	2	1	1	1	1	1	1	1	1	1
Spain	2	2	2	1	1	1	1	1	1	1	1
Sweden	1	1	1	1	1	1	1	1	1	1	1
United Kingdom	2	2	2	1	1	1	1	1	1	1	1

Source: Freedom House, Freedom in The World:1999-2010.The Annual Survey of Political Rights and Civil Liberties.

Table 6. Turkey according to the Political rights and Civil Liberties Criteria (1999-2009).

	Politik Hak	Sivil Özgürlük
1999	4	5
2000	4	5
2001	4	5
2002	3	4
2003	3	4
2004	3	3
2005	3	3
2006	3	3
2007	3	3
2008	3	3
2009	3	3

Source: Freedom House, Freedom in The World: 1999-2010 . The Annual Survey of Political Rights and Civil Liberties.

of judgments between years 1999-2009 with the exceptions of years 2002 and 2008. Finally, one can easily see in Figures 13 and 14 that in the recent three years since 2006, there is again a continuous increase in the number of applications to the ECHR.

Econometric applications

This part of the paper includes econometric applications for Turkey and the EC. In the regression analysis, the main aim was to make a functional analysis to explain the relationship between the variables and to describe this relationship with a model. The linear relationship between the X and Y variables observed in total can be given with the below linear regression model:

$$Y = c + \alpha X + \varepsilon$$

Here, X is independent variable, Y is dependent variable

Table 7. Coefficients.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SCORE	0.042477	0.049522	0.857749	0.3978
PR	0.393635	0.145139	2.712126	0.0110
TEFE (CPI)	-0.183776	0.133766	-1.373867	0.1797
DEBT	-0.180799	0.078179	-2.312639	0.0278
C	4.130866	3.419523	1.208024	0.2365
AR(1)	0.981780	0.035400	27.73414	0.0000
R-squared	0.962689	Mean dependent var		3.276816
Adjusted R-squared	0.956471	S.D. dependent var		0.244104
S.E. of regression	0.050929	Akaike info criterion		-2.965756
Sum squared resid	0.077813	Schwarz criterion		-2.701836
Log likelihood	59.38361	F-statistic		154.8113
Durbin-Watson stat	1.892482	Prob(F-statistic)		0.000000
Inverted AR Roots	.98			

Dependent Variable: RPGDP; Method: Least Squares; Date: 05/11/10; Time: 14:12; Sample (adjusted): 1971 2006; Included observations: 36 after adjustments; Convergence achieved after 15 iterations.

Table 8. Coefficients.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SCORE	0.206582	0.161637	1.278058	0.2110
TEFE (CPI)	-0.002244	0.000929	-2.414939	0.0220
PR	0.010287	0.005883	1.748730	0.0906
DEBT	-0.004161	0.002843	-1.463713	0.1537
C	2.784060	1.596346	1.744021	0.0914
AR(1)	0.967383	0.042406	22.81234	0.0000
R-squared	0.961730	Mean dependent var		3.276816
Adjusted R-squared	0.955352	S.D. dependent var		0.244104
S.E. of regression	0.051579	Akaike info criterion		-2.940377
Sum squared resid	0.079813	Schwarz criterion		-2.676457
Log likelihood	58.92678	F-statistic		150.7814
Durbin-Watson stat	1.722005	Prob(F-statistic)		0.000000
Inverted AR Roots	.97			

Dependent Variable: LRPDP; Method: Least Squares; Date: 05/11/10; Time: 14: 18; Sample (adjusted): 1971 2006; Included observations: 36 after adjustments; Convergence achieved after 17 iterations.

and c is the value of the dependent variable when $X = 0$, α is the regression coefficient and ε is error term. In the paper, regarding the Turkey and EU27 averages, the variables affecting the rate of increase of Real GDP are calculated. The aim of this analysis is to show which variables affect the GDP more, and to facilitate the prediction of comparisons of the predicted results related to Turkey and EU27.

Consequently, dependent variable has been determined

as real GDP growth rate while independent variables have been economic freedom index score (SCORE), political rights (PR) as one of two variables that are published by freedom researches at the worldwide, wholesale price index (TEFE) as an inflation indicator and government debt (DEBT). Data have been retrieved from the official statistics of SPO, TurkStat, Heritage Foundation Freedom House and World Economic Freedom.

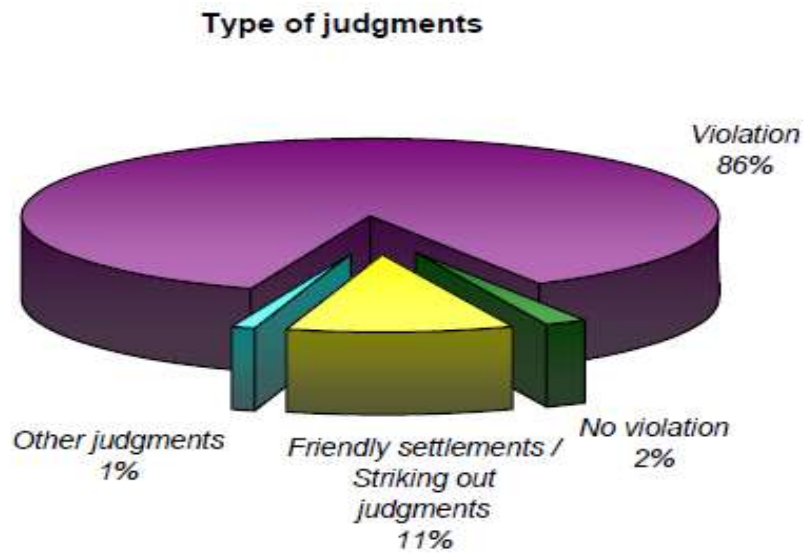


Figure 10. Judgments and decisions. Source: ECHR Official Website.

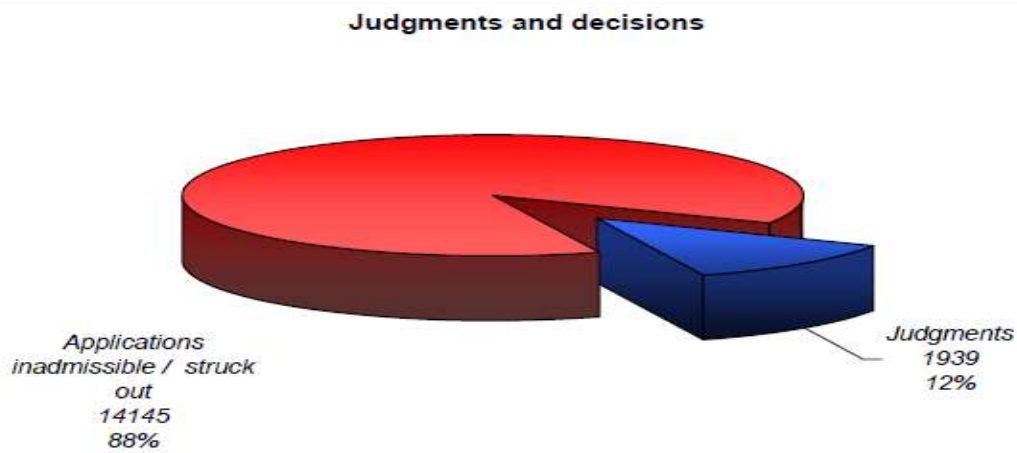


Figure 11. Types of judgments. Source: ECHR Official Website.



Figure 12. Decisions and judgments. Source: ECHR Official Website.

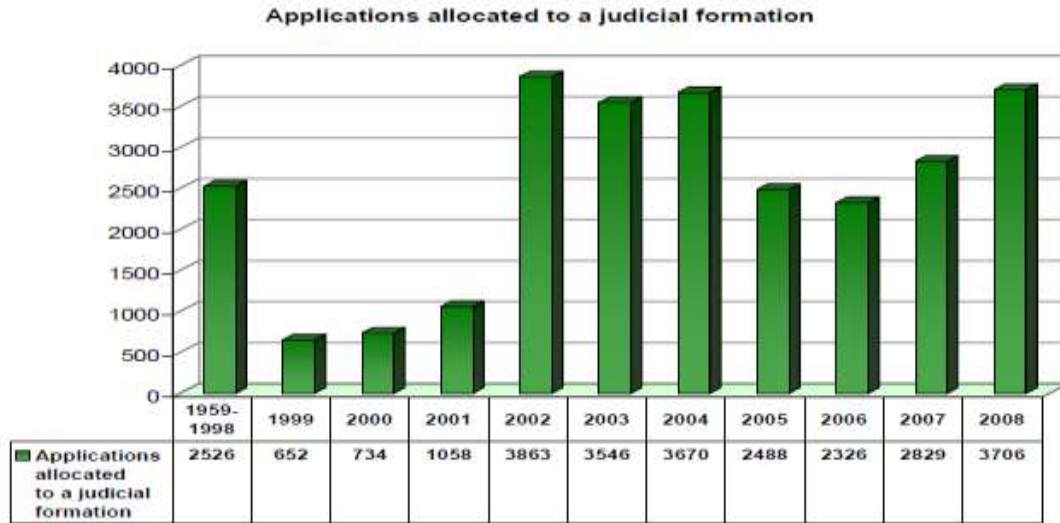


Figure 13. Applications Allocated to a Judicial Formation. Source: ECHR Official Website.

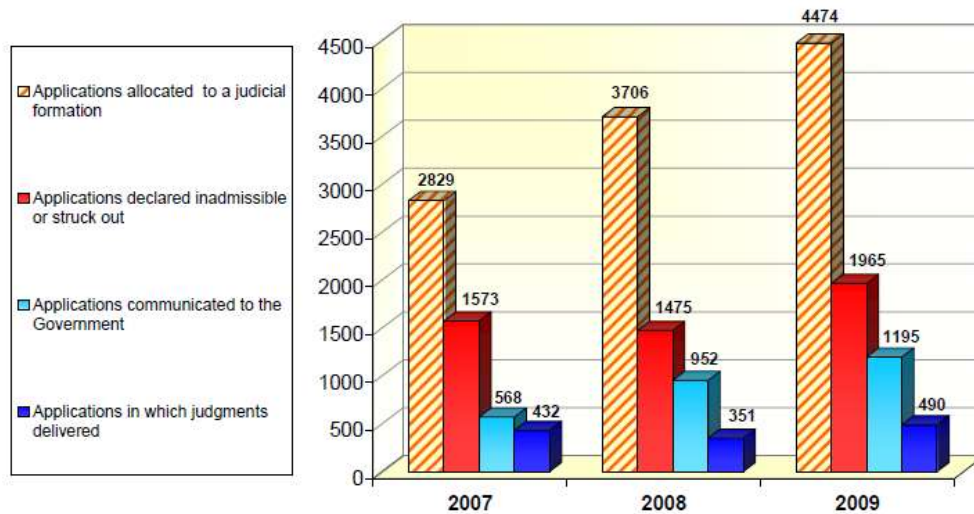


Figure 14. Major procedural steps in processing applications. Source: ECHR Official Website / Analysis of Statistics 2009.

An econometric application for Turkey and EU-27

The results of the regression analysis related to Turkey are given below:

$$RPGDP = 4.13 + 0.04SCORE + 0.39PR - 0.18TEFE - 0.18DEBT + AR(1) + \epsilon$$

(1.21) (0.86) (2.71) (-1.37) (-2.31)

$R^2 = 0.96$ D.W. = 1.89

According to the estimation results for Turkey, t statistics of economic freedom score value (SCORE) and wholesale price index (TEFE) are not meaningful. Explanation power of the model is 0.96 while AR(1) term has been

added to the model in order to avoid the autocorrelation problem. The statistically meaningful variables are political rights (PR) and government debt (DEBT).

The results of the regression analysis related to the average of EU27 are given below:

$$RPGDP = 2.78 + 0.21SCORE + 0.01PR - 0.002TEFE - 0.004DEBT + AR(1) + \epsilon$$

(1.74) (1.27) (1.75) (-2.41) (-1.46)

$R^2 = 0.96$ D.W. = 1.72

According to estimation results of EU-27, t statistics of economic freedom score value (SCORE) and

government debt (DEBT) are not meaningful. The explanation power of the model is 0.96 and again AR(1) term has been added to the model in order to avoid autocorrelation problem. Political rights (PR) and wholesale price index (TEFE) variables are statistically meaningful.

When PR variable is interpreted it can easily be seen that political rights affect GDP growth rate in Turkey more than the EU countries. The basic reason of this result is that Turkey is a developing country and hence it probably reacts more quickly to the ameliorations in the political rights. On the other hand, because EU countries are developed countries, they probably have already given this reaction and this reaction has been weakened in those years that we have analyzed.

Conclusion

Since the very beginnings of the European Union, there are economic and political preconditions, the Maastricht criteria, for each candidate to fulfill. This paper aimed to analyze whether there is a balance between the improvements in political and economic indicators in Turkey. Based upon the available literature, in the first part a review is made according to the related papers. The second part covered the analysis of the progress reports published about Turkey. The progress reports are chosen specifically for the first two years, 1999-2000, which are the first two years of Turkey's official candidacy status, and the last two years, 2008-2009. The third part finally analyzed the economic indicators in the light of data taken from Central Bank, OECD, Heritage Foundation-Wall Street Journal Index of Economic Freedom; and the political indicators in the light of data taken from Freedom House and ECHR.

Although we have expected the improvement of political indicators to lag behind in the economic indicators, the results showed a slight difference as in both indicators there is certain improvement in some aspects. The improvement in economic terms might be seen easily as Turkey, which was considered as a "mostly unfree" country between years 1995-2007, has been categorized among "moderately free" countries since 2007. Still, Turkey is well behind the EU27 average and requires more improvement mainly in terms of financial freedom and freedom from corruption. In addition, even if the score points of Freedom House in political indicators seem to increase compared to previous years, the status of "moderately free" country remains for Turkey and the allocations to ECHR in judicial manner continue to increase. Thus, both in terms of economic and political criteria, the improvements of Turkey are not enough. But, it will not be wrong to claim that in economic terms, Turkey is one step ahead of the political terms. Perhaps, the main reason for this imbalance is the fact that political changes in each and every country are harder to realize

as long as they are seen as the protectors of the system.

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- http://www.abgs.gov.tr/files/AB_Iliskileri/AdaylikSureci/IllemlerRaporlari/turkiye_ilerleme_rap_2009.pdf
- http://www.abgs.gov.tr/files/AB_Iliskileri/Tur_En_Realitons/Progress/turkey_progress_report_2009.pdf
- http://ec.europa.eu/enlargement/pdf/press_corner/keydocuments/report_s_nov_2008/turkey_progress_report_
- http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/108622.pdf
- http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/110889.pdf
- http://ec.europa.eu/economy_finance/publications/publication16004_en.pdf
- http://arsiv.sabah.com.tr/ozel/muzakere1201/dosya_1215.html
- <http://myweb.sabanciuniv.edu/muftuler/files/2008/10/muftulerbacpoliticalreforms.pdf>
- http://www.socialistsanddemocrats.eu/gpes/media3/documents/2285_PL_turkey_enlargement_en_070704.pdf
- http://www.europa-eu-un.org/articles/en/article_5045_en.htm
- <http://www.heritage.org/Index/pdf/2010/countries/turkey.pdf>
- <http://www.heritage.org/Index/Country/Turkey#freedom-from-corruption>
- <http://www.echr.coe.int/ECHR/EN/Header/Reports+and+Statistics/Statistics/Statistical+information+by+year/> (ECHR violations table link)
- <http://www.echr.coe.int/ECHR/EN/Header/Reports+and+Statistics/Statistics/Statistical+information+by+year/> (violations 2009)
- http://www.echr.coe.int/NR/rdonlyres/89A5AF7D-83D4-4A7B-8B91-6F4FA11AE51D/0/Analysis_of_statistics2009.pdf (analysis of 2009 statistics)

ⁱ All of the regulations and laws of the European Union, in other words the total body of EU law accumulated thus far.

ⁱⁱ This part of the paper is a summary of the European Commission Progress Reports

ⁱⁱⁱ Meetings at ministerial level were held in March 2009, and meetings at political director level were held in February and July 2009.

^{iv} Rules on political parties, institution of an Ombudsman, use of languages other than Turkish and enhancement of trade union rights are among the examples.

^v Required by the Accession Partnership Agreement signed between Turkey-EU.

^{vi} See Progress Report 2009 on Turkey http://ec.europa.eu/enlargement/pdf/key_documents/2009/tr_rapport_2009_en.pdf

^{vii} According to the Progress Report 2009, the gap declined from 2.3% in 2007/2008 to 1% in 2008/2009 taking the pre-school education rate up to 33%.

^{viii} According to the Progress Report 2009, the number of such courts increased to 73 from 40 last year. Under the 2005 Law on Child Protection, child courts need to be established in all 81 provinces of the country.

^{ix} According to the Progress Report 2009, the rate increased by 0.9% to 26.1% in 2007 and in rural areas the rate is as high as 42%.

^x See: http://www.europa-eu-un.org/articles/en/article_5045_en.htm

^{xi} Exports to EU rose by only 5% in 2008, while the amount was 49% to the neighbours. Only 48% of Turkey's exports went to the EU compared to 56% in the previous year.

^{xii} Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.

Review

An efficient XML query pattern mining algorithm for ebXML applications in e-commerce

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Received 15 March, 2011; Accepted 4 September, 2014

Providing efficient query to XML data for ebXML applications in e-commerce is crucial, as XML has become the most important technique to exchange data over the Internet. ebXML is a set of specification for companies to exchange their data in e-commerce. Following the ebXML specifications, companies have a standard method to exchange business messages, communicate data, and business rules in e-commerce. Due to its tree-structure paradigm, XML is superior for its capability of storing and querying complex data for ebXML applications. Therefore, discovering frequent XML query patterns has become an interesting topic for XML data management in ebXML applications. The study presents an efficient mining algorithm, namely ebX²Miner, to discover the frequent XML query patterns for ebXML applications. Unlike the existing algorithms, the study proposes a new idea by encoding the XML user queries and then storing these codes to generate the frequent XML user query patterns. Furthermore, the simulation results show that the ebX²Miner outperforms other algorithms in its execution time and used memory space.

Key words: XML query pattern mining, XML query, encoding scheme, ebXML, e-commerce.

INTRODUCTION

XML (Cunningham, 2005) has become the de facto standard for data representation and exchange in e-commerce. The self-describing property empowers XML to represent data without losing semantics, and the semi-structure nature allows XML to model a wide variety of data. As a result, in e-commerce, many applications utilize XML and then follow the ebXML specifications (Bio, 2003) to exchange their data over the Internet. In consequence, the rapid growth of XML data in e-commerce has provided the impetus to design and develop the systems that can efficiently store and query XML data for ebXML applications. ebXML (Bio, 2003) is a

set of specifications which are designed by OASIS (Moberg, 2007) for companies to exchange data in e-commerce. These specifications together enable a modular electronic business framework and are designed based on XML technology. Following the ebXML specifications, companies have a standard method to exchange business messages, communicate data, and business rules in e-commerce. These business messages, communicate data, and rules are described by XML and with the same data frame between different companies. Therefore, most of XML data in ebXML applications has the same standard data structure and

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results in most of their queries may have the same structure with query XML data.

Since XML data in ebXML applications can be treated as trees with elements, attributes, and texts, the query languages, that is, XPath (Clark, 1999) and XQuery (Boag, 2010) are tree patterns with selection predicates on multiple elements that specify the tree-structured relationships. Thus, matching tree patterns against XML data is a core operation in XML query evaluation. This operation can be expensive since it involves navigation through the tree structure of XML data. As a result, the research efforts (Kwon et al., 2008; Lu et al., 2005; Raj et al., 2007) have been focused on the efficient evaluation of tree paths in XML queries.

Another approach (Bei et al., 2009; Chen et al., 2006; Gu et al., 2007; Yang et al., 2008) of improving XML query performance is to discover frequent XML query patterns and to design an index mechanism or cache the results of these patterns. Bei et al. (2009) and Yang et al. (2008) design a transaction summary data structure (that is, the global tree) to merge all of XML user query patterns. At the global tree, the XML candidate query sub trees are generated and their frequencies are thus counted by executing the tree-join process or database scans. As a result, the frequent XML query patterns are efficiently discovered on the processed global tree. In addition, in order to reduce the number of XML candidate query sub trees, Bei et al. (2009) and Yang et al. (2008) use the minimum support constraint to prune the infrequent XML query patterns on the global tree.

The existing approaches (Bei et al., 2009; Chen et al., 2006; Gu et al., 2007; Yang et al., 2008) may not be suitable to discover the frequent XML query patterns in ebXML applications and thus, degrade the system performance. Bei et al. (2009) and Yang et al. (2008) generate the XML candidate query sub trees from the global tree and use costly containment testing to prune the invalid candidate ones for the queries. However, in ebXML applications, most of XML queries have the same structure and results in most of the same query trees are processed. Also, in order to correctly count the frequencies of XML candidate query sub trees, the tree-join process or database scans are executed in their mining process. As a result, Bei et al. (2009) and Yang et al. (2008) still follow the traditional idea of generate-and-test paradigm, for XML query pattern mining and may not be suitable for ebXML applications.

This paper presents a novel algorithm, ebX²Miner, to mine the frequent XML query patterns for ebXML applications in e-commerce. ebX²Miner has the following advantages over the existing approaches. First, ebX²Miner focuses on the characteristic (that is, most of XML queries have the same structure) of ebXML applications and thus discovers the frequent XML query patterns with at most one database scan in the mining process. Although the existing algorithms could efficiently

mine the frequent query patterns by constructing a tree model, two database scans are nonetheless necessary in order to correctly count the frequencies of candidate sub trees, thus, downgrading the system performance. Second, ebX²Miner encodes an XML query tree and stores its nodes' codes to enhance the mining performance. The key concept in ebX²Miner is that the leaf nodes' codes of a user query tree can preserve the tree's structure information. This will greatly reduce the effort of exploring the search space and computing time.

The rest of this paper is organized as follows. Section 2 discusses the previous works related to ebXML applications and XML query pattern mining. Section 3 formalizes the XML frequent query pattern mining problem in this paper. Section 4 describes the details of ebX²Miner algorithm. Section 5 compares the ebX²Miner algorithm with other existing XML query pattern mining algorithms. Section 6 shows the results of the performance study, and Section 7 illustrates the conclusion and further work in this paper.

LITERATURE REVIEW

In this section, some related works are reviewed, including the papers of Bei et al. (2009), Bio (2003), Green et al. (2005), Kim (2002) and Yang et al. (2008) on the ebXML applications and frequent XML query pattern mining.

ebXML provides a modular suite of specifications that enables enterprises of any size and in any geographical location to conduct business over the Internet (Green et al., 2005; Kim, 2002). It purports to support the exchange and query of structured business documents between the applications of trading enterprises so as to support business processes within the trading partner organizations. Indeed, OASIS, one of the joint developers of ebXML, claims that ebXML takes advantage of cost effective Internet technology, is built on EDI experience with input from the EDI community. Therefore, by using ebXML over the Internet, an industry needs to define and collect its business processes, scenarios, and company business profiles, and makes them available through an industry ebXML registry (typically defined using UDDI). Then, structured business documents can be exchanged and queried between trading parties using the automated flow and sequence of interactions that ebXML prescribes.

Many new XML query pattern mining algorithms (Bei et al., 2009; Yang et al., 2008) have been proposed to discover the frequent XML query patterns. Yang et al. (2008) collect all of XML user queries to construct a global tree (T-GQPT) and then employ a rightmost expansion enumeration on the T-GQPT tree to generate XML candidate query sub trees. The main idea of rightmost expansion is that a query tree containing k nodes is generated by appending a new node to the right most path of a frequent sub tree containing $(k-1)$ nodes. Thus,

many infrequent k -node trees are not enumerated if their $(k-1)$ -node sub trees are infrequent. In addition, to compute the frequency of each candidate query sub tree, Yang et al. (2008) scan the database only when the candidate is a single branch tree. Among these algorithms, Fast XMiner (Yang et al., 2003) is the most efficient since the frequency of a non-single branch tree can be computed by joining the ID list of its proper rooted sub trees. On the other hand, 2PXMiner (Yang et al., 2008) extends Fast XMiner to discover the frequent XML query patterns that contain sibling repetitions. In order to speed up the mining performance, 2PXMiner computes the upper bound frequencies of XML candidate query sub trees and uses the minimum support constraint to early prune the infrequent query sub trees.

The VBU XMiner algorithm (Bei et al., 2008; Bei et al., 2009) also maintain a tree-like data structure, the CGTG tree, to merge all of XML queries to discover the frequent XML query patterns. In Bei et al. (2008), all of XML candidate query sub trees are enumerated based on the CGTG tree, and in Bei et al. (2009), the candidates whose frequencies are bigger than the minimum support value are enumerated. Thus, in Bei et al. (2009), before generating the candidate sub trees, the infrequent nodes in the CGTG tree are pruned. Also, the nodes in the CGTG tree are joined with their ancestor nodes which have the same IDs. Therefore, VBU XMiner generate candidate sub trees directly from the CGTG tree without scanning the database. In sum, it discovers the frequent XML query patterns on the processed CGTG tree.

Bei et al. (2008, 2009) and Yang et al. (2008) still follow the traditional idea of generate-and-test paradigm to mine the frequent XML query patterns and thus, have the following drawbacks for ebXML applications in e-commerce. First, they employ the rightmost expansion technique to enumerate all of XML candidate query sub trees on the global trees (that is, T-GQPT and CGTG tree). This approach merges all path and sub tree information of a user query tree in the global trees and thus requires unacceptable costs of tree-join process or database scan during the mining process. Second, a great deal of system space is used to process XML query trees in these algorithms and degrades their mining performance. Unlike Yang et al. (2008), Bei et al. (2009) accumulate the frequencies of XML candidate query sub trees directly from the CGTG tree by executing the tree-join process. Therefore, Bei et al. (2009) are more efficient than Yang et al. (2008). However, Yang et al. (2008) still cost a lot of system time to execute the tree-join process for merging the path and sub tree information to generate frequent XML query patterns on the CGTG tree.

Problem statement

In this section, the problem statement is given to be

solved. It begins by defining the XML query trees, their corresponding rooted sub trees, XML query tree databases, and the frequent XML query trees. Definition 1 defines an XML query tree. Definition 2 illustrates a rooted sub tree of an XML query tree. Definition 3 describes an XML query tree database, while Definition 4 defines the problem in this paper.

Definition 1: An XML query can be modeled as an unordered tree $T_i = \langle N_i, E_i \rangle$, where N_i is the node set, and E_i is the edge set. Nodes $n \in N_i$ represent the elements, attributes, and string values in an XML query, and edges $e \in E_i$ represent the parent-child relationships denoted by “/”.

Definition 2: Given an XML query tree $T_i = \langle N_i, E_i \rangle$ and an XML query rooted sub tree $t_{ij} = \langle N_{ij}, E_{ij} \rangle$. t_{ij} is considered to be the rooted subtree of T_i iff there exists:

- (1) $\text{Root}(t_{ij}) = \text{Root}(T_i)$, where $\text{Root}(t_{ij})$ and $\text{Root}(T_i)$ are the functions which return the root nodes of t_{ij} and T_i respectively.
- (2) $N_{ij} \subseteq N_i, E_{ij} \subseteq E_i$.

Definition 3: Given an XML tree database $D = \{T_1, T_2, \dots, T_n\}$, where T_1, T_2, \dots, T_n represent multiple XML query trees in D .

Definition 4: Given an XML tree database D and a minimum support value m ranging from $(0, 1]$. The frequent XML query pattern mining problem is finding the set S of rooted subtrees t_{ij} such that for each t_{ij} in S , $\text{sup}(t_{ij}) \geq m$ holds, where $\text{sup}(t_{ij})$ is the equation: the number of t_{ij} / the number of XML query trees in D .

Definition 1 defines an XML query as a tree. For example, Figure 1 shows an XML query tree T_i of the query to retrieve the *author* elements that have the string value “john” and are descendants of *book* elements that have a child *title* element whose value is “XML”.

Definition 2 defines an XML query rooted subtree. It shows the rooted subtrees t_{ij} of the query tree T_i . These rooted subtrees have the same root as the T_i and their edges belong to those of T_i . Note that, in this paper, a rooted subtree t_{ij} with k edge is called a k -edge t_{ij} . As a result, subtrees (a) and (b) are 1-edge subtrees, (c), (d), and (e) are 2-edge subtrees, and (f) is a 3-edge subtree.

Definition 3 illustrates an XML tree database D which contains multiple XML query trees. Each query tree in database D represents a transaction associated with its transaction *ID*. For example, in Figure 2, the database $D = \langle T_1, T_2, T_3, T_4, T_5 \rangle$, where T_1, T_2, T_3, T_4 , and T_5 are the query trees and with their transaction *IDs* 1, 2, 3, 4, and 5 respectively. In addition, Definition 4 defines the frequent XML query pattern mining problem in this paper.

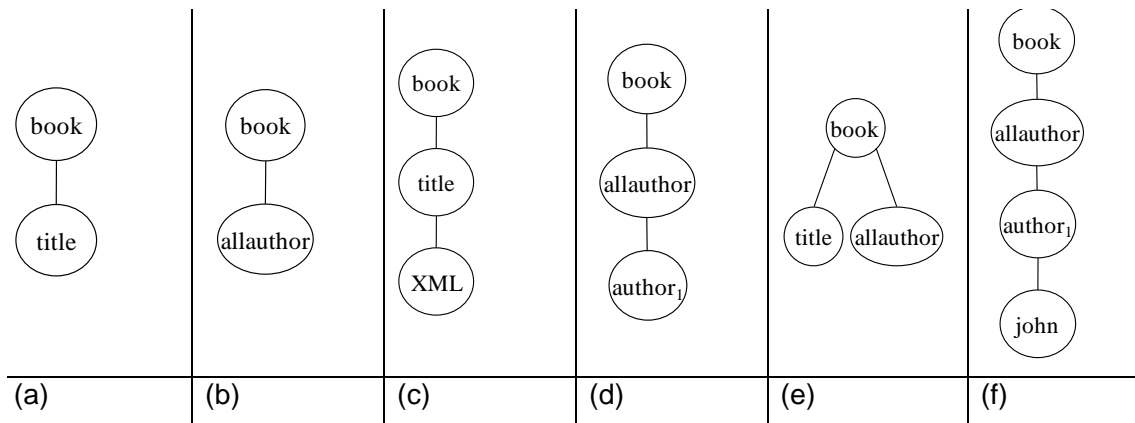


Figure 1. The rooted subtrees of the XML query tree.

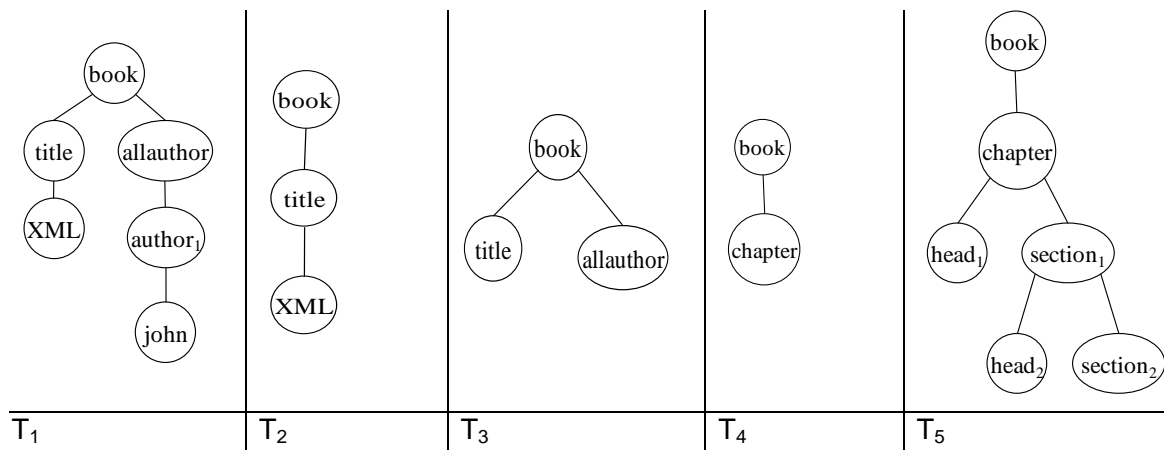


Figure 2. The XML query trees in the database *D*.

FREQUENT XML QUERY PATTERN MINING FOR ebXML APPLICATIONS

In this section, the study proposes an encoding scheme (namely XCode) to represent an XML tree with its corresponding query trees, a data structure (namely XList) to store the codes of XML nodes based on the XCode scheme, and a mining algorithm (namely ebX²Miner algorithm) based on XCode and XList to discover the frequent XML query patterns for ebXML applications in e-commerce.

An encoding scheme: XCode

XCode encodes the nodes of an XML tree in a *xy* coordinate system where *xy* is the coordinate of the two-dimensional space. The following symbols *T_i*, *r*, *k*, *p*, *l*, *fc*, and *nc* are used to represent the nodes in an XML tree.

Symbol *T_i* represents an XML tree, *r* indicates the root node in *T_i*, *k* represents a node in *T_i*, *p* indicates the parent node of *k*, *l* represents the left sibling node of *k*, *fc* denotes the first child node of *k*, and *nc* represents the child node of *k* expect the first child *fc*. The encoding rules are described for the nodes in an XML tree *T_i* and listed as follows:

- (1) For an XML tree *T_i*, the root node *r* is set on the origin whose coordinates *x* and *y* are (0, 0).
- (2) For any node *k* in the tree *T_i*, if *k* is the *fc* node of its parent node *p* and *p*'s coordinates are (*x_p*, *y_p*), then *k*'s coordinates are (*x_p+1*, *y_p+1*).
- (3) For any node *k* in the tree *T_i*, if *k* is the *nc* node of its parent node *p* and its left sibling node *l* has *m* descendant nodes with the coordinates (*x_l*, *y_l*), then *k*'s coordinates are (*x_l+m*, *y_l*).

Note that, for simplify, hereafter, the coordinates of a

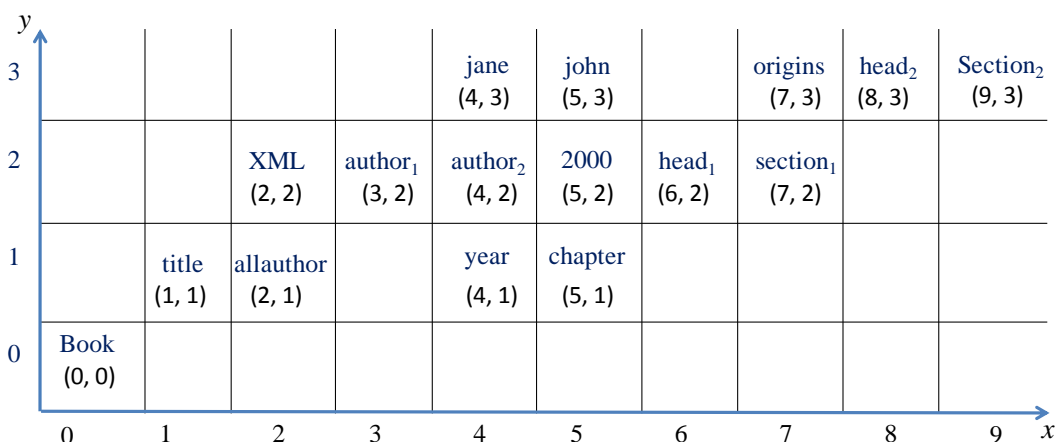


Figure 3. The xcodes of the nodes in the XML tree in Figure 2(a).

node in an XML tree based on the XCode scheme are namely the xcode of a node.

Example 1. Consider the XML tree in Figure 1. Suppose that all of nodes in the tree are encoded by the rules of the proposed XCode scheme. The **xcodes** of these nodes are shown in Figure 3. According to Rule (1), the root node *book* in the XML tree in Figure 1 is set on the origin and its **xcode** is (0, 0). According to Rule (2), the nodes *title*, *XML*, *author₁*, *john*, *jane*, *2000*, *head₁*, *origins*, and *head₂* are the *fc* nodes of a node in the tree and their **xcodes** are (1, 1), (2, 2), (3, 2), (5, 3), (4, 3), (5, 2), (6, 2), (7, 3), and (8, 3) respectively. Also, by Rule (3), the nodes *allauthor*, *year*, *chapter*, *author₂*, *section₁*, and *section₂* are the *nc* nodes of a node in the tree and their **xcodes** are (2, 1), (4, 1), (5, 1), (4, 2), (7, 2), and (9, 3) respectively.

Derived from the XCode encoding rules, Lemmas 1, 2, 3 and 4 show the features of **xcodes** of an XML tree. Lemma 1 describes that an **xcode** reveals the level of a node in an XML tree, Lemmas 2 and 3 illustrate the relationship between two **xcodes** of nodes in an XML tree, and Lemma 4 illustrates that the values of **xcode** are bigger than or equal to 0.

Lemma 1 for any two nodes f_1 and f_2 in an XML tree T_i with the **xcodes** (x_1, y_1) and (x_2, y_2) respectively, if node f_2 is a child node of f_1 , then $y_2 = y_1 + 1$.

Proof: If f_2 is the first child node of f_1 , according to Rule (2), the **xcode** (x_2, y_2) of f_2 is equal to (x_1+1, y_1+1) ; otherwise, that is equal to (x_s+m, y_s) , where (x_s, y_s) is the **xcode** of f_1 's first child node f_s and f_s has m descendant nodes. Thus, if f_2 is the first child node of f_1 , $y_2 = y_1 + 1$. In addition, since $y_2 = y_s$ and $y_s = y_1 + 1$ which result in $y_2 = y_s = y_1 + 1$. As a result, $y_2 = y_1 + 1$.

Lemma 2: For any node f in an XML tree T_i , if f 's **xcode** is (x, y) , then the value of y is equal to the level l of the

node f in T_i .

Proof: We prove the lemma by showing that the value of y is equal to that of l . There are three cases, depending on whether node f is the root, *fc*, or *nc* node in T_i .

Case 1: Suppose that node f is the root node in T_i . According to Rule (1), the **xcode** of f is (0, 0). Thus, the value of y is equal to 0. Also, since f is the root node, f 's level/ is equal to 0. As a result, the value of y is equal to that of l .

Case 2: Suppose that f is the *fc* node in T_i . Since f is not the root node and with the level l , it has the ancestor nodes p_0, p_1, \dots, p_{l-1} , where p_{l-1} is f 's parent node, p_{l-2} is p_{l-1} 's parent node, ..., and p_0 is the root node. According to Rule (1), the **xcode** of p_0 is (0, 0). Thus, y_{p_0} is equal to 0. Also, according to Lemma 2, p_1 's **xcode** $y_{p_1} = y_{p_0} + 1$. Thus, $y_{p_1} = y_{p_0} + 1 = 0 + 1 = 1$. In consequence, p_2 's **xcode** $y_{p_2} = y_{p_1} + 1 = 1 + 1 = 2$. Therefore, p_{l-1} 's **xcode** $y_{p_{l-1}} = l - 1$. Since f is the child node of p_{l-1} , f 's **xcode** $y = y_{p_{l-1}} + 1 = l - 1 + 1 = l$. As a result, the value of y is equal to that of f 's level l .

Case 3: Suppose that f is the *nc* node and thus has a sibling node *fc* in T_i . According to *Case 2*, the *fc*'s **xcode** $y_{fc} = l$. In consequence, according to Rule (3), f 's **xcode** y is equal to y_{fc} . As a result, $y = y_{fc} = l$ and the value of y is equal to that of f 's level l .

Based on *Case 1*, *Case 2*, and *Case 3*, we thus prove this lemma.

Lemma 3: For any two nodes f_1 and f_2 in an XML tree T_i with the **xcodes** (x_1, y_1) and (x_2, y_2) respectively, if node f_2 is a descendant node of f_1 , then both of the values of x_2 and y_2 are bigger than those of x_1 and y_1 respectively.

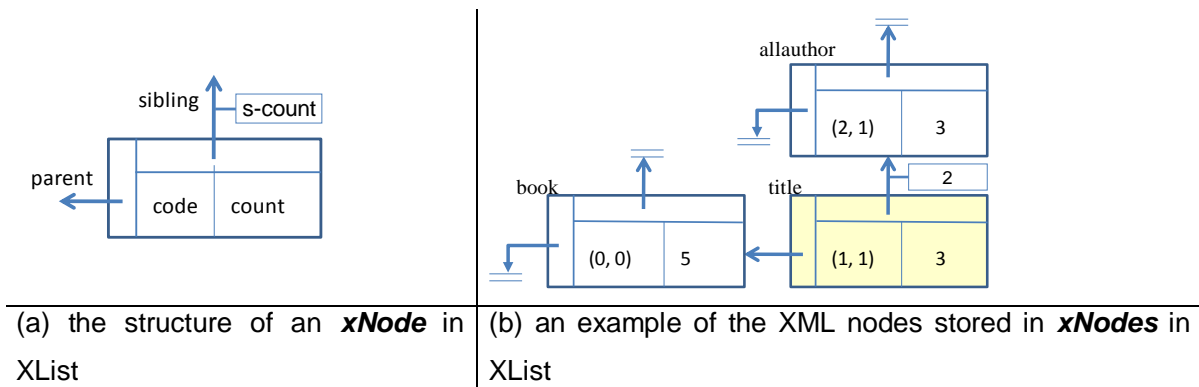


Figure 4. The structures and contents of *xNodes* in XList.

Proof: the study proves the lemma by showing that $x_2 > x_1$ and $y_2 > y_1$. There are two cases, depending on whether node f_2 is a child node or not of f_1 .

Case 1: Suppose that node f_2 is a child node of f_1 . If f_2 is the first child node of f_1 , according to Rule (2), the **xcodes** (x_2, y_2) of f_2 is equal to (x_1+1, y_1+1) ; otherwise, that is equal to (x_s+m, y_s) , where (x_s, y_s) is the **xcodes** of f_1 's first child node f_s and f_s has m descendant nodes. Thus, if f_2 is the first child node of f_1 , $x_2 = x_1 + 1$ and $y_2 = y_1+1$ which result in $x_2 > x_1$ and $y_2 > y_1$ respectively. In addition, since $x_2 = x_s + m$, $y_2 = y_s$, $x_s = x_1 + 1$, and $y_s = y_1 + 1$ which result in $x_2 > x_s > x_1$ and $y_2 > y_s > y_1$. As a result, $x_2 > x_1$ and $y_2 > y_1$.

Case 2: Suppose that node f_2 is not a child node of f_1 and has a parent node f_a which is a child node of f_1 . According to Case 1, node f_a 's **xcodes** $x_{fa} > x_{f1}$ and $y_{fa} > y_{f1}$. Also, since f_2 's **xcodes** $x_{f2} > x_{fa}$ and $y_{f2} > y_{fa}$, they result $x_{f2} > x_{f1}$ and $y_{f2} > y_{f1}$.

Based on Case 1 and Case2, we thus prove this lemma.

Lemma 4: For any node f in an XML tree T_i , the values in f 's **xcodes** (x, y) are bigger than or equal to 0.

Proof: There are three cases, depending on whether node f is the root, *fc*, or *nc* node in T_i .

Case 1: Suppose that node f is the root node in T_i . According to Rule (1), f 's **xcodes** (x, y) is $(0, 0)$. As a result, the values in f 's **xcodes** (x, y) are equal to 0.

Case 2: Suppose that f is the *fc* node and f has ancestor nodes p_0, p_1, \dots, p_n in T_i , where p_n is f 's parent node, p_{n-1} is p_n 's parent node, ..., and p_0 is the root node. According to Case 1, the values of p_0 's **xcodes** are equal to 0. Also, according to Rules (2) or (3), the values of p_i 's **xcodes** are the sum of those of p_0 's **xcodes** with 1 or the number of

descendant nodes of its sibling node. Therefore, the values of p_i 's **xcodes** are bigger than 0. In consequence, according to Rules (2) or (3), the values of the **xcodes** in p_2, p_3, \dots, p_n are thus bigger than 0. Since, according to Rule (2), the values in f 's **xcodes** are the sum of those of p_n 's **xcodes** with 1. As a result, the values in f 's **xcodes** are bigger than 0.

Case 3: Suppose that f is the *nc* node and thus has a sibling node *fc* in T_i . According to Case 2, the values of *fc*'s **xcodes** are bigger than 0. In consequence, according to Rule (3), the values in f 's **xcodes** are the sum of those of *fc*'s **xcodes** with 1 or the number of *fc*'s descendant nodes. As a result, the values in f 's **xcodes** are bigger than 0.

Based on Case 1, Case 2, and Case 3, the study proves this lemma.

XList

In this subsection, the data structure XList that plays an important role in the design of our mining algorithm is described. XList is designed to record the **xcodes** of nodes in XML query trees. In order to store an XML node, in XList, a new node (namely *xNode*) with two variables and two pointers is created. Figure 4 (a,b) presents an XML node to be stored in an *xNode* of XList. Variable *code* is used to store an XML node's **xcodes**, and variable *count* is used to store the number of occurrences of the XML node of a user query tree in a database. Also, two pointers *parent* and *sibling* are used to link the XML node's parent and sibling nodes respectively. Furthermore, the *sibling* pointer has a variable *s-count* to record the number of occurrences of the relationships between two XML nodes. For example, the *title* node is shown in the query trees $T_1, T_2,$ and T_3 in the database D . Through the XCode scheme, the **xcodes** of the *title* node is $(1, 1)$ and it can be stored in an *xNode* of XList; the *title*

node's parent and sibling nodes are the *book* and *allauthor* nodes and linked by its *parent* and *sibling* pointers respectively. The **xcodes** of nodes *book* and *allauthor* are (0, 0) and (2, 1) respectively, while the numbers of occurrences of those nodes are 5 and 3 respectively. In addition, the *s-count* variable between the *title* and *allauthor* nodes is 2.

In the mining scheme, XList is constructed to store the nodes of XML query trees including their **xcodes** and the number of their occurrences in an XML query tree database. Construction of the XList consists of two steps. In the first step, the path information of an XML query tree is concerned (that is, the XL-Path algorithm), while in the second step, the subtree information of an XML query tree is considered (that is, the XL-Subtree algorithm). In the XL-Path algorithm, the leaf nodes of XML query trees are concerned to record the path information of an XML query tree. If no *xNode* exists in XList, these leaf nodes are stored in the new created *xNodes* of XList; otherwise, their *xcodes* are compared with the variables *code* of the existing *xNodes*. On the other hand, in the XL-Subtree algorithm, the relationship of a pair of leaf nodes of XML query trees is considered to deal with the subtree information of an XML query tree. If the relationship is not recorded in XList, the *sibling* pointers of *xNodes* are used; otherwise, the number of their occurrences is recorded in the existing variables *s-count*. The following symbols T_i , l_i , (l_x, l_y) , t_i , a_i , n_i , and d_i are used in the XL-Path and XL-Subtree algorithms to represent how to record the information of XML query trees in XList. Symbol T_i represents an XML query tree, l_i indicates a leaf node of T_i and (x_i, y_i) denotes the *xcode* of l_i . On the other hand, for the data structure XList, symbol n_i represents a new created *xNode*, t_i represents the *xNodes* which are not lined by any *parent* pointer of an *xNode*, a_i indicates an ancestor node of t_i , and d_i shows a descendant node of an *xNode*.

Lines 2-5 store all of T_i 's leaf nodes into the new created *xNodes* since there is no *xNode* in XList. Lines 7-28 compare the *xcode* (l_x, l_y) with the variable *code* of t_i in XList. Line 10 adds the value 1 to the variables *count* of t_i and all of t_i 's ancestor nodes a_i since t_i 's *code* is the same as the *xcode* of l_i . Lines 13-15 store l_i into a new created *xNode* n_i and link t_i 's *parent* pointer to n_i since l_i is an ancestor node of t_i and t_i has no ancestor node. Line 17 adds the value 1 to the variables of node a_i and all of a_i 's ancestors since a_i is the same as l_i . Lines 19-22 find an *xNode* a_i which is a descendant node of l_i , store l_i into a new created *xNode* n_i , and insert n_i between a_i and a_i 's parent node. Lines 24-25 store l_i into a new created *xNode* n_i and link n_i 's *parent* pointer to t_i since l_i is a descendant node of t_i . Finally, Line 27 stores l_i into a new created *xNode* n_i since l_i and t_i have no ancestor-descendant relationship (Figure 5).

For example, suppose that all of the query trees T_1 , T_2 , ..., and T_5 are sequential read and processed by the XL-

Path algorithm as shown in Figure 6. Firstly, T_1 is read and Lines 2-5 are executed since there is no *xNode* in XList. Thus, the leaf nodes *XML* and *john* of T_1 are stored in the new *xNodes* n_1 and n_2 of XList. Then, T_2 is read and Line 10 is executed since the leaf node *XML* of T_2 is the same as the *xNode* n_1 . Therefore, the value 1 is added into the variable *count* of n_1 and results. In consequence, T_3 is read and Lines 13-15 are executed since T_3 's leaf nodes *title* and *allauthor* are the ancestors of *xNodes* n_1 and n_2 respectively. Thus, two new *xNodes* n_3 and n_4 are created to store the two leaf nodes and *xNodes* n_1 and n_2 's parent pointers are linked to n_3 and n_4 respectively. Also, the values of variables *count* of n_3 and n_4 are set by the values 3 and 2 which are the sum of the value 1 and those values in variables *count* of n_1 and n_2 , respectively. After reading T_4 , Lines 2-5 are executed and the new *xNode* n_5 is thus created for T_4 's leaf node *chapter*. Finally, T_5 is read and Lines 24-25 are executed. The new *xNodes* n_6 , n_7 , and n_8 are created for T_5 's leaf node *head₁*, *head₂*, and *section₂*. Also, the parent pointers of n_6 , n_7 , and n_8 is linked to n_5 .

In Figure 7, Line 3 links the *sibling* pointers between the two leaf nodes l_i and l_j 's corresponding *xNodes* n_i and n_j in XList. Lines 5-10 add the value 1 to the variables *s-count* between *xNodes* n_i and n_j .

For example, suppose that all of query trees T_1 , T_2 , ..., and T_5 are sequential read and processed by the XL-Subtree algorithm as shown in Figure 7. Firstly, T_1 is read and Lines 3-8 are executed since the relationship between the leaf nodes *XML* and *john* are not recorded in their corresponding *xNodes* n_1 and n_2 . Thus, the *sibling* pointer of n_1 is linked to n_2 and the variable *s-count* is set to the value 1. Then, T_2 is read and is not processed since it has no a pair of leaf nodes. In consequence, T_3 is read and Lines 7-8 are executed since T_2 's leaf nodes *title* and *allauthor* are the ancestors of *xNodes* n_1 and n_2 respectively. Thus, the *sibling* pointer between *xNodes* n_3 and n_4 are created. Also, the value of variable *s-count* is set by the sum of value 1 and the value of d_i 's *s-count*. In addition, T_4 is read and not to be processed since it has no a pair of leaf nodes. Finally, T_5 is read and then Lines 3-5 are executed to show the result in Figure 8.

An XML frequent pattern mining algorithm for ebXML applications: ebX²Miner

This subsection provides an overview of the ebX²Miner algorithm to mine frequent XML query patterns from an XML query tree database for ebXML applications. The ebX²Miner is an efficient mining algorithm to discover frequent XML query patterns based on the novel encoding scheme XCode and data structure XList. Figure 9 shows the procedure of the ebX²Miner algorithm. The following symbols n_i , t_i , p_i , (c_x, c_y) , z_i , *temp_n*, *ct*, *fp*, and *fs* are used to describe the ebX²Miner algorithm. In XList,

Algorithm XL-Path (T_i)Input: An XML query tree T_i

Output: XList

```

1       if there is no xnode in XList then
2       create the new xnodes  $n_1, n_2, \dots, n_i$  for all of  $T_i$ 's leaf nodes  $l_1, l_2, \dots, l_i$  respectively
3       store the xcodes of nodes  $l_1, l_2, \dots, l_i$  into the variables code of xnodes  $n_1, n_2, \dots, n_i$ 
4       respectively
5       set the variables count of xnodes  $n_1, n_2, \dots, n_i$  with the value 1
6       else
7       for each leaf node  $l_i$  of  $T_i$ 
8       compare the  $l_i$ 's xcodes  $(l_x, l_y)$  with the variable code of each  $t_i$  in XList
9       if xcodes  $(l_x, l_y)$  is the same with  $t_i$ 's code then
10      add value 1 to the count variables of  $t_i$  and all of  $t_i$ 's ancestor nodes  $a_i$ 
11      else
12      if  $l_i$  is the ancestor node of  $t_i$  and  $t_i$  has no ancestor node  $a_i$ 
13      store the node  $l_i$  into a new created xnode  $n_i$ 
14      link the parent pointer of  $t_i$  to  $n_i$ 
15      set the value of variable count of  $n_i$  is the sum of that of  $t_i$  with 1
16      if  $l_i$  is an ancestor of  $t_i$  and  $t_i$  has an ancestor  $a_i$  which is the same as  $l_i$ 
17      add value 1 to the variable count of  $a_i$  and all of  $a_i$ 's ancestor nodes
18      if  $l_i$  is an ancestor of  $t_i$  and all of  $t_i$ 's ancestor  $a_i$  are different from  $l_i$ 
19      find the xnode  $a_i$  which is a descendant node of  $l_i$ 
20      store node  $l_i$  into a new created xnode  $n_i$ 
21      link the parent pointer of  $n_i$  to  $a_i$ 's parent pointer
22      link the parent pointer of  $a_i$  to  $n_i$ 
23      if  $l_i$  is a descendant node of  $t_i$ 
24      store node  $l_i$  into a new created xnode  $n_i$ 
25      link  $n_i$ 's parent pointer to  $t_i$ 
26      add value 1 to the count variables of  $n_i$  and all of  $n_i$ 's ancestor nodes
27      if  $l_i$  and  $t_i$  have no ancestor-descendant relationship
28      store node  $l_i$  into a new created xnode  $n_i$  in XList
29      end if
30      end for
31      end if
32      return XList

```

Figure 5. Algorithm XL-path.

symbol n_i illustrates an xNode, t_i indicates the node which has no descendant node, p_i represents t_i 's parent node, (c_x, c_y) represents the code in t_i , z_i indicates the

sibling node of t_i , and $temp_n$ represents a temp xNode. Symbol ctz indicates a cross subtree of nodes t_i and z_i . In addition, symbol fp indicates a set frequent path, while fs

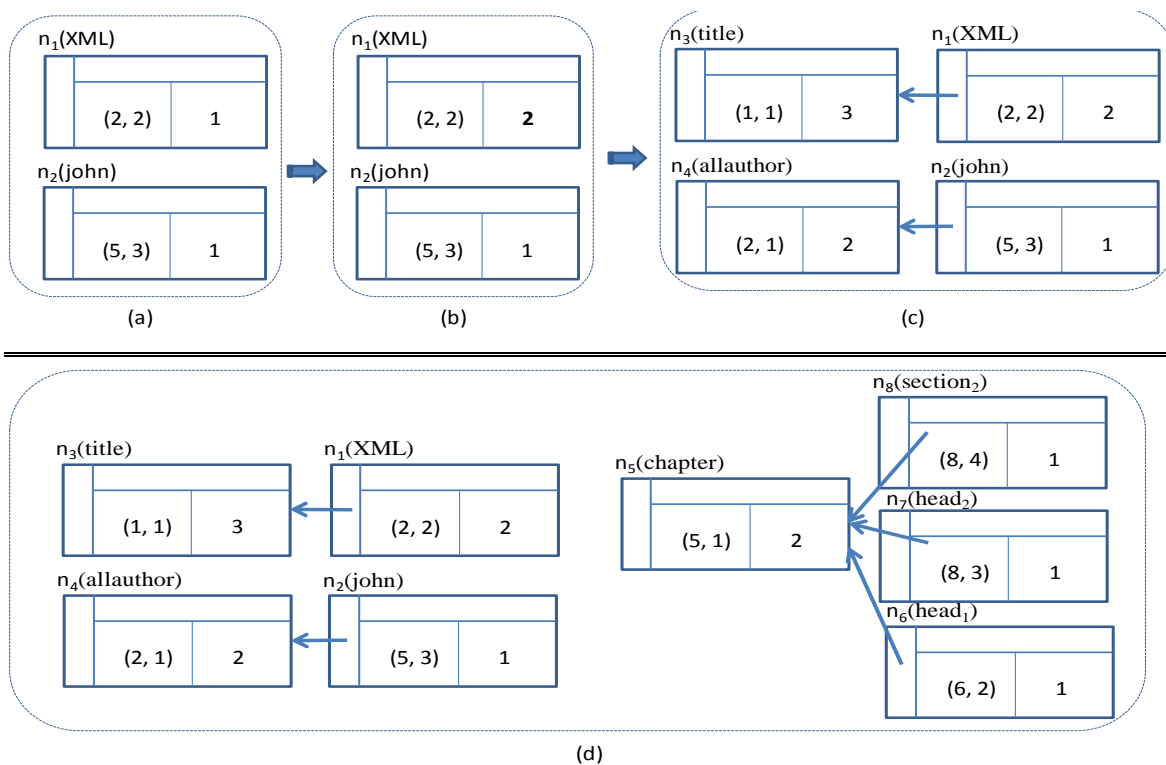


Figure 6. The XList for the XML query trees in Figure 4 after executing the XL-Path algorithm.

Algorithm XL-Subtree(T_i)

Input: An XML query tree T_i

Output: XList

- 1 for each pair of leaf nodes l_i and l_j of T_i
- 2 if the relationship between l_i and l_j is not recorded in **xnodes** n_i and n_j
- 3 link the *sibling* pointers between n_i and n_j
- 4 if there is no variable *s-count* of the descendant nodes d_i of n_i and n_j
- 5 set the variable *s-count* between n_i and n_j with the value 1
- 6 else
- 7 set the variable *s-count* between n_i and n_j with the value which is the sum of
- 8 the value of variable *s-count* of d_i and value 1
- 9 else
- 10 add 1 to the *s-count* variables between n_i and n_j
- 11 end if
- 12 end for
- 13 end while
- 14 return XList

Figure 7. Algorithm XL-Subtree.

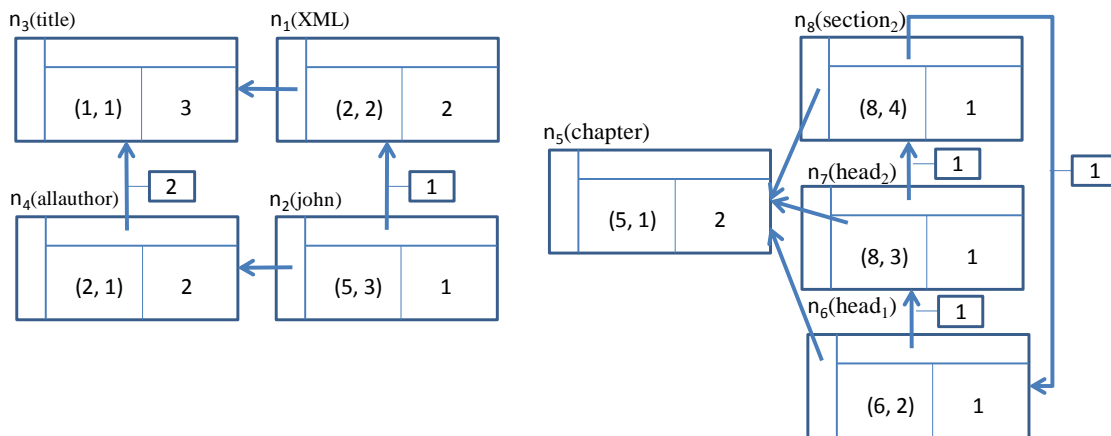


Figure 8. The XList for the XML query trees in Figure 4 after executing the XL-Subtree algorithm.

```

Algorithm ebX2Miner(D, m)
Input: A set of query trees in D; specified minimum sum
Output: A set of frequent query subtrees
1 /*scan the database D to construct XList;*/
2   for each Ti in the database D
3     XList = XL-Path(Ti);
4     XList = XL-Subtree(Ti);
5   end-for;
6 /* remove the infrequent nodes from XList; */
7 for each xnode ni in XList
8   if the value of count is small than m
9     delete the xnode ni
10    delete ni's sibling pointer
11    delete all of ni's descendant nodes
12  end if
13 end for
14 /* generate the frequent subtrees from XList; */
15 for each xnode ti with xcode (cx, cy) in XList
16  while cx > 0
17    add a path (pi, ti) into set fp
18    if ti has the sibling node zi
19      add the cross subtree ctz into set fs
20    end if
21    set temp_n is pi
22    set pi is the parent of pi
23  end while
24  delete ti
25  delete ti's sibling pointer
26 end for
  
```

Figure 9. Algorithm ebX²Miner.

shows a set of frequent subtrees.

In Figure 9, firstly, all of XML user query trees in *D* are read and encoded by the proposed scheme XCode to construct XList. This step is done by the algorithms XL-Path and XL-Subtree. Secondly, the study prunes the infrequent query trees in XList by executing Lines 6-13. Finally, the study enumerates the frequent XML query pattern from XList by executing Lines 14-26.

For example, suppose that the database *D* has five query trees *T₁*, *T₂*, ..., and *T₅* and the value of *m* is 0.4. Firstly, after executing Lines 2-5, the content of XList is shown. Then, Figure 10 shows the results after executing Lines 6-13. Finally, sets *fp* and *fs* after executing Lines 14-26 are shown.

COMPARISONS

In this section, there is the comparison of ebX²Miner with other algorithms, including the VBUXMiner (Bei et al., 2009), XQPMiner, XQPMinerTID, and 2PXMiner (Yang et al., 2008) algorithms.

Comparing with VBUXMiner

ebX²Miner is more suitable for ebXML applications in e-commerce than the VBUXMiner algorithm. First, most of XML queries in ebXML applications have the same data structure. However, the VBUXMiner algorithm does not consider the characteristic of the XML queries in ebXML applications and thus merges all of queries into the CGTG tree. Therefore, to obtain the frequent XML query trees, the incomplete information of an XML query tree on the CGTG tree is collected by executing the tree-join process. In contrast, ebX²Miner considers the characteristic of ebXML applications and thus encodes the nodes of XML user query trees. As a result, the path and

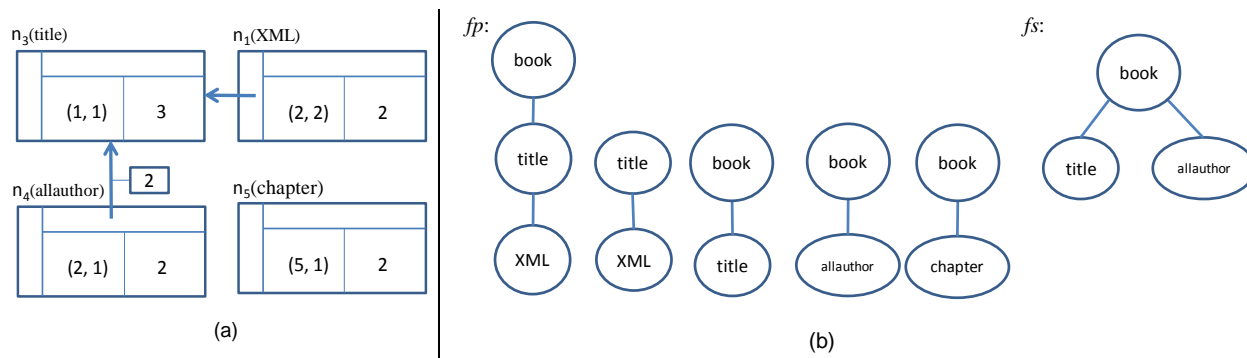


Figure 10. The frequent query patterns for the XML query trees.

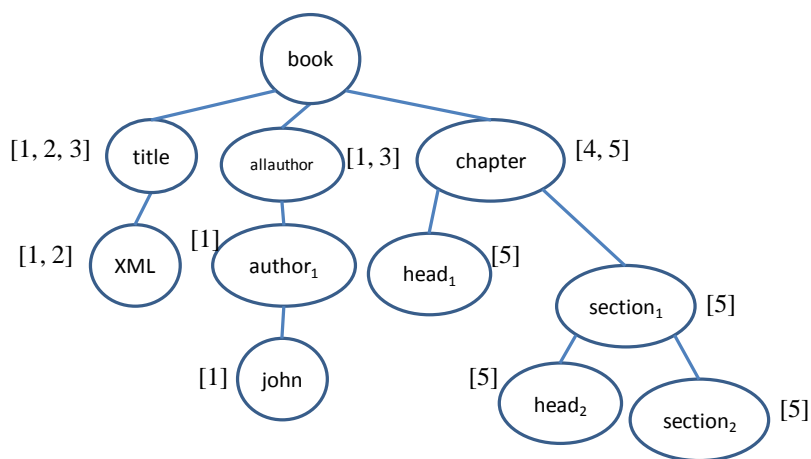


Figure 11. The CGTG tree of the query trees in database *D*.

subtree information of an XML query tree are preserved in the leaf nodes' codes and the tree-join process for producing the frequent query trees can be ignored. For example, the query trees are merged by the VBUXMiner algorithm and result in the CGTG tree as shown in Figure 11. In Figure 11, the incomplete information of a frequent XML query tree is shown and results in the VBUXMiner algorithm to execute the tree-join process or database scans. However, the complete information (that is, path and subtree) of a frequent query tree is preserved by the XCode and XList schemes in ebX²Miner. Therefore, the tree joining process and database scans cannot be used in ebX²Miner for generating frequent XML query trees.

Comparing with XQPMiner, XQPMinerTID, and 2PXMiner

One reason confirms that ebX²Miner may outperform XQPMiner, XQPMinerTID, and 2PXMiner. XQPMiner, XQPMinerTID, and 2PXMiner construct the T-GQPT tree

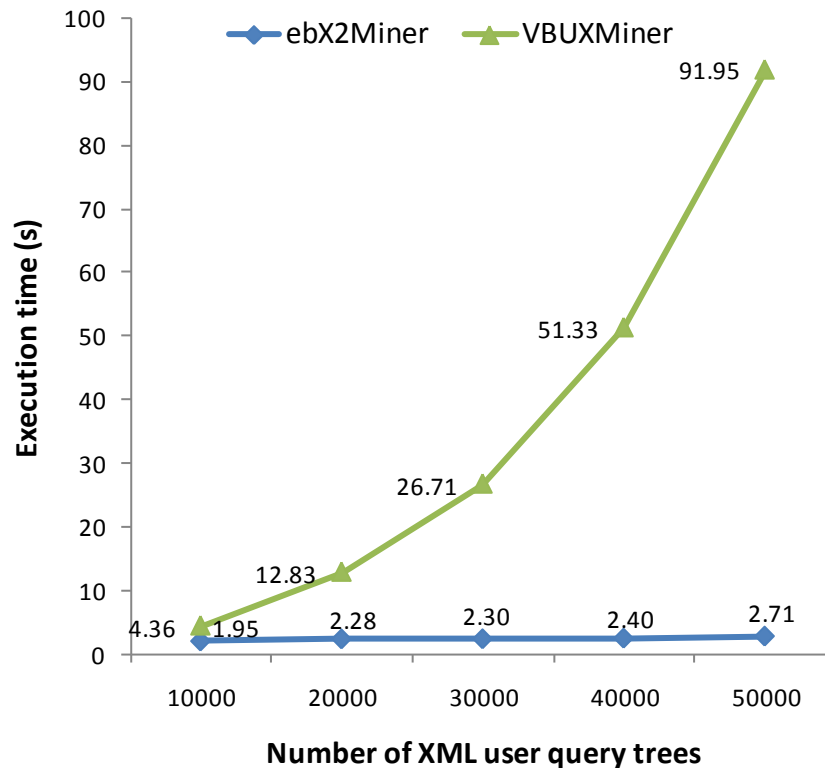
to summarize all of query trees in database *D* and then generate all of single branch candidate subtrees from the T-GQPT tree. Through tree joining process (that is, constructing data structure *ECTree*), the single branch candidate subtrees are merged to produce the frequent query trees. Therefore, for ebXML applications, more XML query trees are processed on the T-GQPT tree and thus cost a lot of time to produce frequent XML query trees. In contrast, ebX²Miner encodes the nodes of an XML query tree and thus preserves the path and subtree information of the query tree in the system to reduce time and space costs.

PERFORMANCE STUDY

Two experiments are performed to illustrate the performance under ebX²Miner and VBUXMiner algorithms. Parameters and their settings in the simulation are listed in Table 1. The parameter *n* denotes the number of XML query trees in the database *D*, while the parameter *s*

Table 1. Simulation parameters and settings.

Parameters	Descriptions	Settings
n	Number of XML query trees	10000 ~ 50000
S	Minimum supports	3%~8%

**Figure 12.** The execution time with varying number of XML query trees.

represents the value of minimum support in the system.

The first experiment (Figures 12 and 13) observes the execution time and memory space (Y-axis) of these algorithms under different number of XML query trees (X-axis). The memory space used in ebX²Miner and VBUXMiner is measured by their created nodes in XList and CGTG tree respectively. The specified minimum support s is set to be 5%. ebX²Miner outperforms VBUXMiner on the execution time. Both curves for VBUXMiner and ebX²Miner increase as the number of XML query trees increases. Obviously, ebX²Miner changes slightly as the number of XML query trees increases. In contrast, VBUXMiner changes heavy. One reason could be the high efficiency and stability of the ebX²Miner. VBUXMiner does not consider the path and subtree of XML user query trees in its CGTG tree. Thus, the tree-joining process and database scans are executed to combine this information. As a result, more execution

time is used in VBUXMiner for generating the frequent XML query patterns. This is consistent with the experimental result. The used nodes generated from ebX²Miner in XList are less than those from VBUXMiner in CGTG tree. A possible reason is that the XCode scheme encodes the path and subtree information in the nodes of XList and results in a few XML nodes in query trees stored in XList.

The second experiment (Figure 14) observes the execution time (Y-axis) of ebX²Miner and VBUXMiner under different minimum supports (X-axis). The specified number of XML query trees is set to 30000. ebX²Miner outperforms VBUXMiner on the execution time. Both curves for VBUXMiner and ebX²Miner change slightly as the specified minimum support increases. A possible reason is that when the specified minimum support increases, most of the candidate subtrees of ebX²Miner and VBUXMiner are produced from XList and CGTG tree

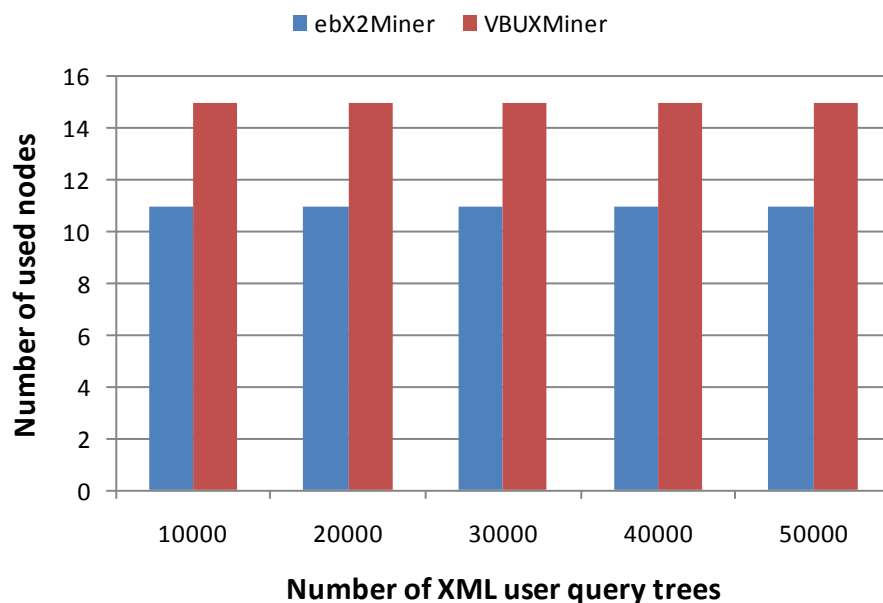


Figure 13. The enumerated nodes with varying number of XML query trees.

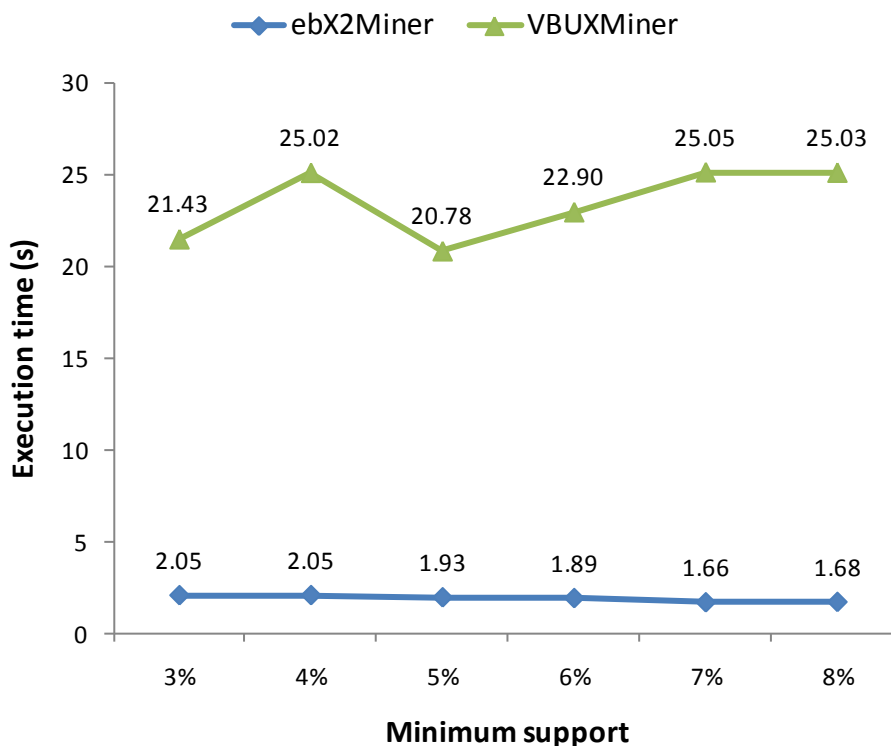


Figure 14. The execution time with varying minimum supports.

respectively. The execution time of ebX²Miner is less than that of VBUXMiner. The reason is that VBUXMiner cost a lot of time to execute the tree-joining process to

produce the frequent XML query patterns.

The two experiments as mentioned above show that ebX²Miner has higher mining performance than

VBUXMiner. This is because by XCode and XList schemes, the path and subtree information are preserved in the leaf nodes of query trees and result in less space and time cost in the ebX²Miner.

Conclusion

This paper presents an efficient mining algorithm ebX²Miner to discover frequent XML query patterns. Unlike the existing algorithms, the study proposes a new idea by encoding XML user query trees (that is, XCode) and thus, stores these codes (that is, XList) to preserve the path and subtree information of query trees. With this idea, it becomes obvious that ebX²Miner is not capable of maintaining all of the user queries and thus takes less execution time and memory space to produce frequent XML query patterns for ebXML applications. The future work in this study includes expanding XML query patterns with repeating-siblings, since ebX²Miner cannot mine the frequent XML query patterns with sibling repetitions.

Conflict of Interests

The author has not declared any conflict of interests.

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Full Length Research Paper

Home telehealth acceptance model: The role of innovation

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Received 22 March, 2011; Accepted 6 August, 2014

This study aims at exploring the role of user innovativeness in the home telehealth acceptance model, clarifying whether innovativeness is the antecedent to or moderator of the Technology Acceptance Model (TAM); it also aims to discover the influences of related discussion on user acceptance. The results show that innovation is both the antecedent to and the moderator of TAM. Attitude toward using home telehealth services could be enhanced through improvement of individual innovation. Suggestions are proposed for individuals with high or low innovation, respectively.

Key words: Home telehealth, technology acceptance, user innovation, health care, telemedicine, moderator analysis.

INTRODUCTION

Home telehealth is defined as “the use of telecommunications by home care providers to link patients or customers to one or more out-of-home sources of care information, education, or service by means of telephones, computers, interactive television, or some combination of each” (Home Care Management Associates Ltd., 1998). The purposes of home telehealth services are to prevent diseases, monitor diseases, and promote home healthcare, whereas telemedicine services relate primarily to diagnosis and treatment. Furthermore, clinical applications of home telehealth services have proven the effectiveness in the field of pediatrics and geriatrics (Grimm and Anglin, 2006; Hebert et al., 2006; Koch, 2006; Moehr et al., 2006). The benefits of home telehealth services include cost efficiency (Bott et al., 2007; Buysse et al., 2007; Jerant et al., 2001; Johnston et al., 2000; Puentes et al., 2007), and improvements to the quality of life (Schopp et al., 2006). Hence, home telehealth will

become a trend in the 21st century (Haux, 2006; Miller, 2007).

In spite of the growing popularity of home telehealth services, evaluation studies of the integrated model framework are few in number, particularly those in Asian countries (Koch, 2006). As the healthcare system is user-centered, this study targets healthcare professionals, rather than the general public (Kim and Chang, 2007; Wilson and Lankton, 2004), as the research subjects (Chau and Hu, 2002; Pare et al., 2006; Schaper and Pervan, 2007; Tabish, Jennifer, and Roger, 2008; Wu et al., 2007; Zheng et al., 2007). Therefore, studies conducted from the perspective of users could make the overall evaluation system more comprehensive (Wilson and Lankton, 2004).

Rogers (1995) defined “innovativeness” as the acceptance of a new idea, behavior, or objective by individuals. Home telehealth services constitute innovativeness when

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accepted by users or individuals as a new idea or behavior. In Taiwan, home telehealth was introduced in 2008, and is regarded a newly emerged service with very few users. As a result, usage behavioral intention (BI), rather than actual usage, is an accurate indicator of actual need for home telehealth.

This study attempted to provide a clear understanding of the factors affecting user innovativeness decisions, thus allowing service providers to develop appropriate marketing strategies and effectively enhancing user acceptance. Studies of user innovativeness have flourished in recent years, as users are an important source of innovation in many different industries (Viktor and Cornelius, 2007). Therefore, this study aimed to explore the role of user innovativeness in the home telehealth acceptance model, whether innovativeness is an antecedent to or a moderator of Technology Acceptance Model (TAM), and discovering the influences of related discussion on user acceptance. The results can provide valuable references for management, policy makers, and future research.

LITERATURE REVIEW AND THEORETICAL BACKGROUND

TAM

TAM (Davis, 1989; Davis et al., 1989) originates from the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), and comprises five constructs: perceived ease of use (PEOU), perceived usefulness (PU), attitudes toward use (ATT), behavioral intention to use (BI), and actual system use (AU). The definition of PEOU is "the degree to which a person believes that using a particular system would be free from effort," and that of PU is "the degree to which a person believes that using a particular system would enhance job performance." PU and PEOU are the key factors required for the acceptance of new information technologies (ITs); furthermore, PEOU affects PU, and ATT directly affects BI (Davis, 1989).

Although technological advancements have been made on information systems (IS), TAM disregards social influence on technological acceptance. For example, Legris et al. (2003) argued that social evolution or an innovative model can enhance the explanatory power of TAM, thereby addressing the issue of limited medical informatics in the field of health care. The development of TAM relies on providing greater healthcare (Chau and Hu, 2002; Kim and Chang, 2007; Raghupathi, 1997; Schaper and Pervan, 2007; Zheng et al., 2007).

There are a number of studies on the applications of TAM in healthcare. Chau and Hu (2002) suggested that TAM may be more adept than the Theory of Planned Behavior (TPB) in examining personal technology

acceptance. Wilson and Lankton (2004) indicated that future research should consider using other methods or constructs to develop a better model. Therefore, this study aimed to investigate the key factors affecting individual acceptance of e-health care.

Innovativeness

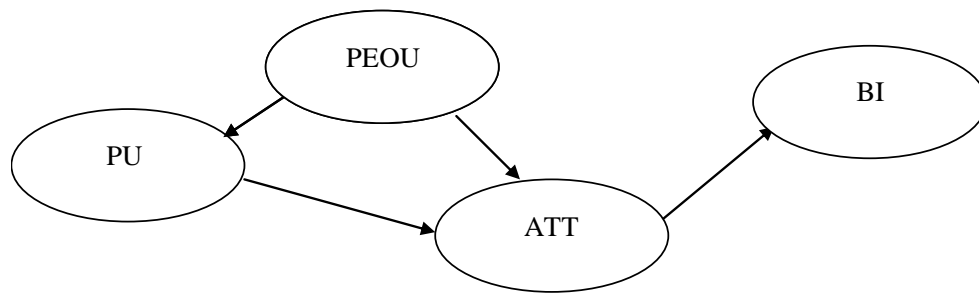
Rogers (1995) defined innovativeness as "the degree to which an individual or other units of adoption is relatively earlier in adopting new ideas than other members of the social system." Goldsmith and Hofacker (1991) defined innovativeness as "the relative willingness of a person to try a new product or service." There are divergent definitions on innovativeness (Roehrich, 2004). Gatignon and Robertson (1985) concluded that, "consumers who depend on normative influences (desire for conformity) adopt more slowly." Rogers defined innovators as those individuals or units of adoption possessing a high level of innovativeness (Rogers, 1995). Agarwal and Prasad (1998) indicated that perceptions of innovation are independent key variables regarding technological information adoption.

The nature of TAM is that "the non-existence of moderating influences the relationship between perceptions and adoption decisions"; it can be inferred that it has a significant moderating influence on personal innovativeness (Agarwal and Prasad, 1998).

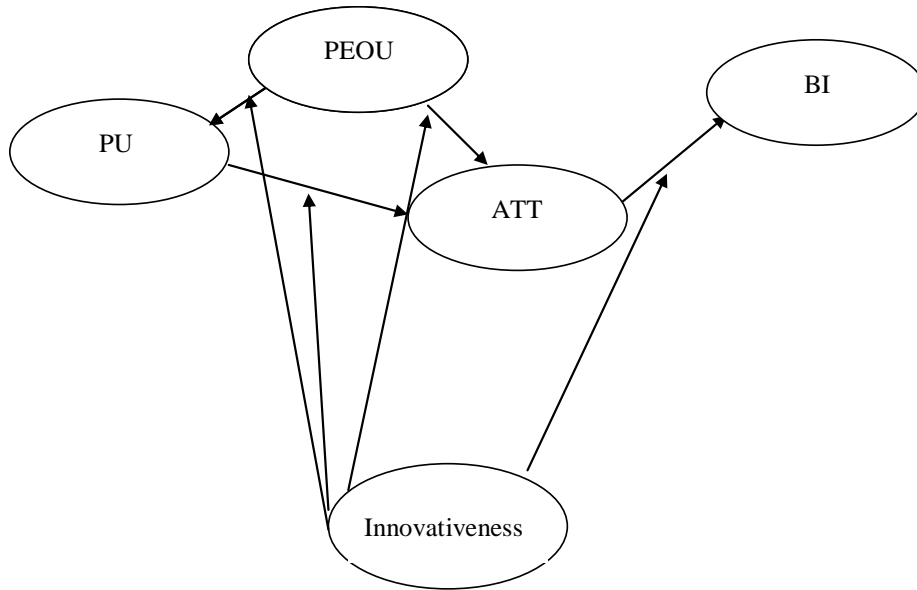
Schillewaert et al. (2005) pointed out that individual innovativeness directly affects technology adoption, positively affects PEOU, and indirectly affects adoption through usefulness and ease of use. Moreover, other researches referred to consumer innovativeness as a force leading to innovative behavior, which is also cited and studied by researches on diffusion of innovation (Brian et al., 2005; Li, 2003; Pamela et al., 2004; Roehrich, 2004). Hung et al. (2003) surveyed the adoption of WAP (Wireless Application Protocol) services in Taiwan based on the innovation diffusion theory, and found that WAP has greater acceptance with higher personal innovativeness. Shintaro (2007) also pointed out that BI tends to increase with personal innovativeness. Hence, this paper adopts the definition of Rogers (1995) and proposes the following hypotheses (Figure 1).

Hypothesis 1 (Moderator hypotheses)

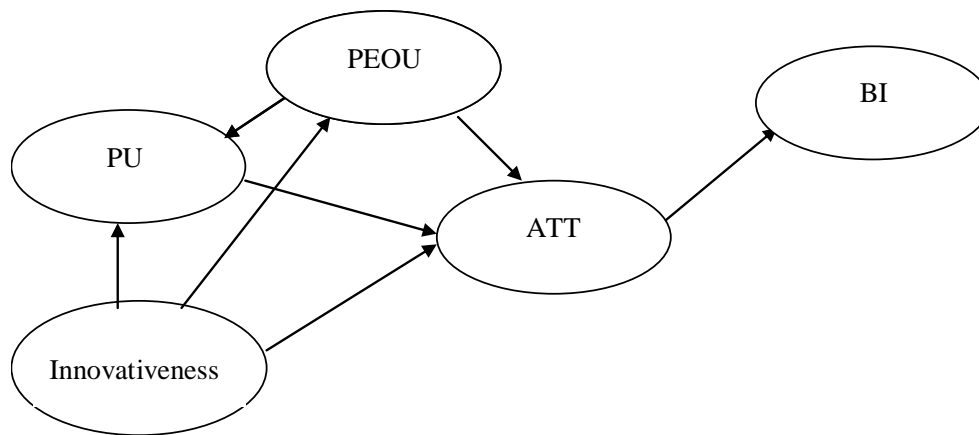
H_{1a}: High versus low innovativeness strengthens the effect of perceived ease of use (PEOU) on perceived usefulness (PU). *H_{1b}*: Perceived ease of use (PEOU) strengthens attitude toward using (ATT). *H_{1c}*: Perceived usefulness (PU) strengthens attitude toward using (ATT). *H_{1d}*: Attitude toward using (ATT) strengthens behavioral intention to use (BI).



(a) Original model: TAM.



(b) Innovativeness as a moderator



(c) Innovativeness as an antecedent.

Figure 1a-c. Alternative conceptualizations of Innovativeness. Note: perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATT), behavioral intention to use (BI).

Hypothesis 2 (Antecedents hypotheses)

H2a: Innovativeness has a positive effect on perceived

ease of use (PEOU). *H2b:* Innovativeness has a positive effect on perceived usefulness (PU). *H2c:* Innovativeness has a positive effect on attitude toward using (ATT).

Table 1. Fit indices for measurement and structural models (TAMs: Original model and Innovativeness as an antecedent).

Fit indices	Recommended value	Measurement model	Structural models of TAM	
			Original	Innovativeness
GFI	≥ 0.9	0.85	0.95	0.94
AGFI	≥ 0.8	0.82	0.93	0.91
NFI	≥ 0.9	0.98	0.99	0.99
CFI	≥ 0.9	0.99	0.99	0.99
RMSEA	≤ 0.1	0.057	0.052	0.052
RMR	≤ 0.05	0.05	0.018	0.019
χ^2 / d.f.	≤ 3	2.21	2.09	2.08

METHOD

Research design and data collection

Since home telehealth is in its incipient stage in Taiwan, a convenience sample is appropriate for those with little knowledge of home telehealth, which could undermine the effectiveness of a questionnaire. Home telehealth can also facilitate the promotion of home health care regarding the senior population, the prevention of diseases, and the monitoring of diseases. The subjects of this study were visitors, aged over 15 years, to the Taiwan International Senior Lifestyle and Health Care (SenCARE 2007) exhibition. This exhibition, sponsored by the Taiwan External Trade Development Council (TAITRA) and supported by the Telecare Industry Alliance of Taiwan, is the largest ever hosted in Taiwan and focuses on a comprehensive spectrum of resources for senior citizens. The exhibition showcases products and services for physiological monitoring (including home telehealth), emergency aid products and services. This study collected 369 valid samples. Most respondents are female (53%), aged over 65 (44%), followed by the age groups of 45 to 54 (28%) and 55 to 64 (27%), have university degree (35%), followed by post-graduate degree (18%), and have an average monthly income of NT\$50,000 - NT\$80,000 (US\$1 ≈ NT\$32.55).

Measures of the constructs

This study is based on the definitions and constructs related to TAM (Davis, 1989; Davis et al., 1989) and innovativeness (IN) (Rogers, 1995). TAM encompasses four constructs: perceived ease of use (PEOU), perceived usefulness (PU), attitude toward use (ATT), behavioral intention to use (BI). The operationalization and sources of the measurement items of this study are shown in Appendix A. The measurement is based on a Likert 5-point scale, where 1 denotes "strongly disagree" and 5 denotes "strongly agree".

Data analysis methods

Confirmatory factor analysis (CFA) was conducted to examine the reliability and validity of the measurement model, and structural equation modeling (SEM) was applied to interpret the causal model, using LISREL 8.7. The study applied the maximum likelihood method to estimate each of the path coefficients, and used the following seven indicators to evaluate the model's overall goodness

of fit: chi-square statistic/degree of freedom, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), comparative fit index (CFI), root mean square residual (RMR), and root mean square error of approximation (RMSEA).

RESULTS

Reliability and validity of the measurement model

In this study, the measurement model included 17 indicators that describe 5 latent constructs (PEOU, PU, IN, ATT, BI). Seven goodness-of-fit indices, as proposed by Hu and Bentler (1999), were used to assess the overall model fit: Chi-square statistic/degree of freedom, GFI, AGFI, NFI, CFI, RMR, and RMSEA. The results of CFA are presented in Table 1. The goodness-of-fit indices suggested that the measurement model is a good fit. This study further evaluated the psychometric properties of the measurement model in terms of reliability, convergent validity and discriminant validity.

CFA was conducted to examine the reliability and validity of the measurement model, and Cronbach's alpha, and constructed reliability to assess the internal consistency of the measurement model (Table 2). The construct reliabilities (ranging from 0.83 - 0.92) and alpha coefficients (ranging from 0.82 - 0.92) of all five constructs were greater than the benchmark of 0.6, as suggested by Bagozzi and Yi (1988), thus indicating high internal consistency and the reliability of each construct.

The construct validity included convergent and discriminant validities. Table 2 shows the test results of convergent validity. As seen, all values of the standardized factor loadings of the indicators of each construct were within the range of 0.74 to 0.90, which are greater than the suggested level of 0.50 (Hair et al., 2006); moreover, they were statistically significant at $p < 0.01$. Hence, the convergent validity of the measurement indicators was acceptable. In addition, this study conducted a discriminant validity test to differentiate the

Table 2. Reliability and validity results.

Categories	Standardized factor loading
Perceived ease of use (0.91, 0.91) ^a	
PEOU1	0.83
PEOU2	0.85
PEOU3	0.88
PEOU4	0.84
Perceived usefulness ^b (0.90, 0.91) ^a	
PU1	0.84
PU2	0.89
PU3	0.87
Innovativeness (0.83, 0.82) ^a	
IN1	0.77
IN2	0.84
IN3	0.74
Attitude toward using (0.90, 0.89) ^a	
ATT1	0.89
ATT2	0.85
ATT3	0.84
Behavioral intention to use (0.92, 0.92) ^a	
BI1	0.90
BI2	0.84
BI3	0.89
BI4	0.83

a Values in parentheses for constructs indicate construct reliability and Cronbach's alpha, respectively.

constructs used in this study, following the method suggested by Hair et al. (2006) of pairing two latent constructs, and then subjects them to two models of CFA. The first model allows unconstrained correlation estimation between the two constructs, while the other model provides a constrained correlation, set at 1, between the two constructs.

This study applied the chi-square difference test to compare the first and second models. All chi-square difference values were statistically significant at $p < 0.01$. Hence, discriminant validity was confirmed.

Structural model (original model: TAM)

SEM can interpret the causal model, and the structural model of the original TAM is a good fit to the data (Table 1). Figure 2 presents the results of TAM. PEOU significantly and positively affects PU and ATT (standardized path coefficients are 0.96 and 0.33, respectively). PU (standardized path coefficients = 0.63) significantly and

positively affects ATT. ATT (standardized path coefficients = 0.99) significantly and positively affects BI.

Moderating the effects of innovativeness

This study aims to clarify whether TAM is affected by innovativeness. Since innovativeness is a multiple and continuous variable, this paper tests the significance by an interaction latent variable to determine the interactive effect (moderating effect). Holmbeck (1997) indicated that, to examine the interactive effects of continuous variables through latent variable analysis, all possible products of the measurable indicators can serve as indicators of interactive latent variables. Joreskog and Yang (1996) and Jaccard and Wan (1996) suggested that, fewer terms and more continuous variables should be used to test the significance of the interactive effects.

This study follows the suggestions of the above researchers (Holmbeck, 1997; Jaccard and Wan, 1996; Joreskog and Yang, 1996) to examine the interactive

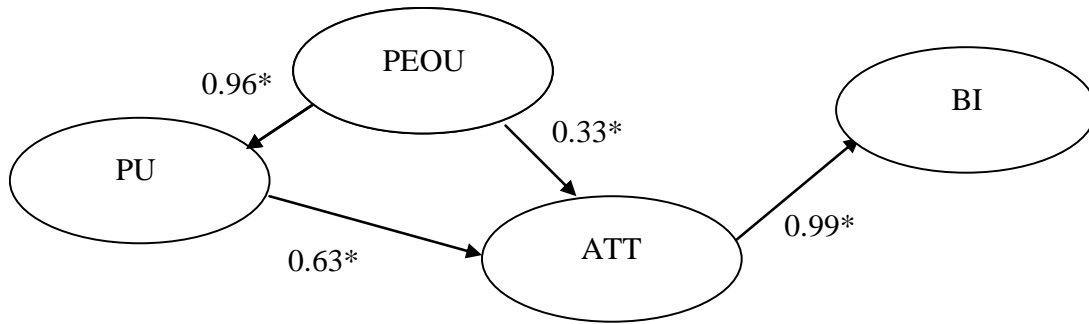


Figure 2. Original TAM. Note: perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATT), behavioral intention to use (BI). *Path coefficient is significant at the 0.05 level.

Table 3. The results of moderating effects—innovativeness from continuous variable analysis.

Path	Model-fit indices						Interaction latent variable	
	NFI	CFI	NNFI	IFI	PNFI	PGFI	Unstandardized Path coefficients	t-value
PEOU → PU	0.91	0.92	0.90	0.92	0.78	0.56	0.14**	11.56
PEOU → ATT	0.91	0.92	0.90	0.92	0.78	0.54	0.20**	8.38
PU → ATT	0.93	0.93	0.92	0.93	0.79	0.56	0.33**	5.36
ATT → BI	0.93	0.93	0.92	0.93	0.78	0.54	0.07**	6.24
Recommended value	≥ 0.9	≥ 0.9	≥ 0.9	≥ 0.9	≥ 0.5	≥ 0.5		

** t-value>1.96.

Table 4. The results of Cluster analysis: mean, sample size.

Clusters indicators	Innovativeness		
	High (n=139)	Medium (n=110)	Low (n=120)
In1	4.31	3.19	2.58
In2	4.29	3.33	2.55
In3	4.22	3.85	2.48

effects, and selects the innovativeness latent variable with the largest factor loading (innovativeness 2; IN2).

This study then crosses it with each latent variable indicator to create their respective interactive latent variables (that is, cross innovativeness with PEOU to further create an interaction latent variable, such as innovativeness 2 (IN2) × each indicator of PEOU, resulting in 4 interaction indicators). This study also tests the interactive effect (moderating effect), as shown in Table 3. The moderating effects of innovativeness on the four models (PEOU→PU, PEOU→ATT, PU→ATT, and ATT→BI) invariably provide a good fit to the data.

According to Hair et al. (2006), the adopted criteria are: Normed Fit Index (NFI), Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI), Incremental Fit Index (IFI) ≥ 0.9, Parsimony Normed Fit Index (PNFI), and Parsimony Goodness of Fit Index (PGFI) ≥ 0.5. Moreover, path coefficients for the interactive latent variables of the four models all reach statistical significance, indicating that innovativeness acts as a moderator of TAM.

To visualize the nature of significant interactive effects, this study employs the following method. First, it applies cluster analysis to categorize innovativeness, and K-means clustering to the innovativeness data, with k = 2 to 4. Since the pseudo - F from the 3-cluster partition is greater than the k=2 and k=4 solutions (Calinski and Harabasz, 1974), this study performs a k-means cluster on k=3. The results of the 3-mean clustered analyses are reported in Table 4. The three groups are high - innovativeness (sample size 139), medium -innovativeness (sample size 110), and low -innovativeness (sample size 120). This paper then conducts multiple-group SEM to test the moderating effects of innovativeness across the three groups.

This study conducts a series of multiple-group analyses with LISREL 8.7, and examines whether these

Table 5. The results of moderating effects.

Path	Unstandardized Path coefficient			The chi-square difference Statistics
	High-innovativeness (n=139)	Medium-innovativeness (n=110)	Low-innovativeness (n=120)	
PEOU → PU	0.37**	0.56**	0.40**	$\Delta\chi^2 = 22.5^{**}$
PEOU → ATT	0.20*	ns	0.68**	$\Delta\chi^2 = 6.32^{**}$
PU → ATT	ns	ns	ns	$\Delta\chi^2 = ns$ (Continuous variable analysis with Innovativeness shows significance)
ATT → BI	1.19**	1.02**	0.65**	$\Delta\chi^2 = 27.12^{**}$

Note: $\Delta\chi^2$ is the testing statistics which testing the path coefficients is the same for the two groups and is the value of chi-square with two degree of freedom, ($\chi^2_{0.05}(2) = 5.991$), ** $p < 0.05$, * $p < 0.1$, ns (insignificant) is $p > 0.1$.

innovativeness groups differed from the path coefficient of the structural model. To test the path coefficient, Byrne (1994) suggested that the multiple-group analyses should have two stages: 1) constrain the factor loadings of the measured research variables to equal the innovativeness groups, 2) evaluate the chi-square statistics of the combined model, so that all path parameters of TAM can vary across the innovativeness groups. This procedure can test whether the measurement is invariant across the innovativeness groups. This study evaluates the chi-square statistics of the combined model, and constrains the path parameters from PEOU to PU (each pair of these two latent constructs) to equal the innovativeness groups. Then, it conducts a chi-square difference test to compare the first-stage model with the second-stage model. If reaching a significant level, innovativeness qualifies as a moderator of TAM.

As Table 5 shows, innovativeness is a moderator of TAM, and it has a significant moderating effect on all four relationships (PEOU→PU, PEOU→ATT, PU→ATT, and ATT→BI) (Tables 4 and 5). (1) As for PEOU→PU, three groups of innovativeness show positive effects, and the medium-innovativeness group displays greater significance effects than the other two. (2) Regarding PEOU→ATT, three groups of innovativeness show positive effects, and the low-innovativeness group displays greater significance effects than the other two, indicating that a lower innovativeness has effects of greater significance on PEOU→ATT. (3) Regarding PU→ATT, the continuous variable analysis shows a significant difference, indicating that innovativeness qualifies as a moderator in this relationship. (4) Regarding ATT→BI, there is a positive effect on the three groups, and the high-innovativeness group displays greater significance effects than the other two, indicating that the higher innovativeness significantly affects

ATT→BI. In sum, in regard to TAM, PEOU acts as the key factor in the lower innovativeness group, thus, hypotheses 1a, 1b, 1c, and 1d are all supported.

Modeling innovativeness as an antecedent to TAM

This study employs SEM to explore innovativeness as an antecedent to TAM. All goodness-of-fit indices for the structural model reach the recommended value, as shown in Table 1. It indicates that the model of innovativeness, as an antecedent to TAM, is a good fit to the data. Moreover, hypotheses 2a, 2b, and 2c are all evidenced, as shown in Figure 3, indicating that innovativeness (standardized path coefficients for H2a, H2b, and H2c are: 0.89, 0.26, and 0.56, respectively) has a significant positive effect on PEOU, PU, and ATT, thus innovativeness qualifies as an antecedent to PEOU, PU, and ATT. On the other hand, the following relationships are shown in the model of the original TAM. First, PEOU has a significant positive effect on PU and ATT (standardized path coefficients are 0.73 and 0.52, respectively). Second, ATT (standardized path coefficient is 0.99) has a significant positive effect on behavioral intention to use (BI).

DISCUSSION

This study explores the role of user innovativeness in the home telehealth acceptance model, and clarifies whether innovativeness is an antecedent to or a moderator of TAM. The improvements of innovation for individuals can enhance the attitude toward using home telehealth. The following is a summary of the findings of this study. The original model (TAM) reveals that the impact of PU on

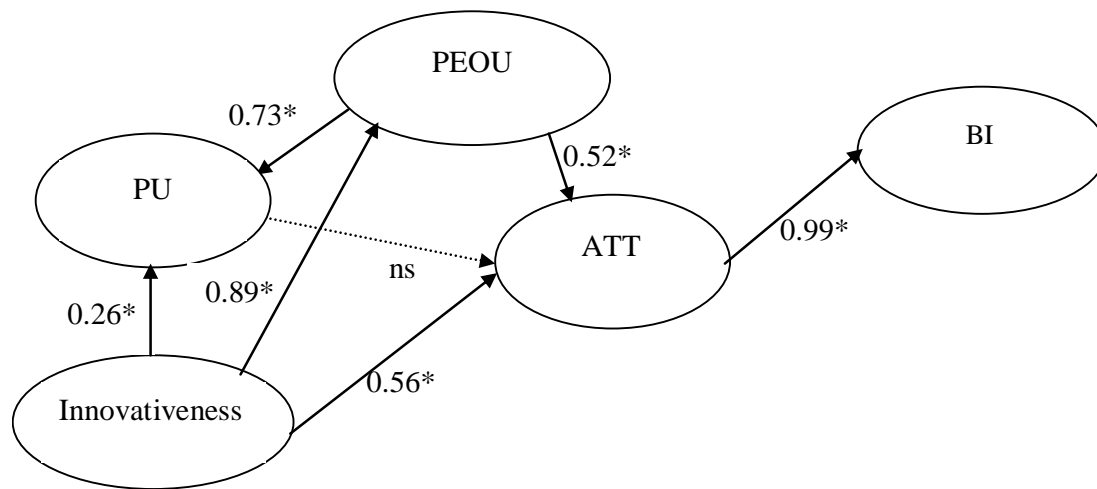


Figure 3. TAM of innovativeness as an antecedent. Note: perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATT), behavioral intention to use (BI). *Path coefficient is significant at the 0.05 level.

ATT, with respect to home telehealth services, is higher than that of PEOU. This result is consistent with that of Chau and Hu (2002), who investigated physicians' acceptance of telemedicine technology, and found that PU is a critical determinant of attitude, as well as in previous application researches (Agarwal and Prasad, 1999; Hung and Chang, 2007; Keil et al., 1995; Schepers and Wetzels, 2007; Venkatesh et al., 2003; Zheng et al., 2007) on TAM. PEOU significantly affects PU, and this result is consistent with previous researches (Agarwal and Prasad, 1999; Davis, 1989; Davis et al., 1989; Kim and Chang, 2007; Legris et al., 2003; Schepers and Wetzels, 2007; Venkatesh et al., 2003) on TAM. As Moehr et al. (2006) indicated that patients and their families, rather than merely the providers, should gain more knowledge on home telehealth use in order to generate the full clinical value of the home telehealth system. In sum, TAM provides an acceptance model for home telehealth services, with a focus on PU for improving ATT. In addition, enhancing users' PEOU can strengthen PU. Therefore, education and training is important for users' ease of use of the home telehealth system, as the users realize that home telehealth is a useful, convenient and easily used service.

Innovativeness acts as a moderator of TAM, and has significant positive moderating effects on all four relevant relationships (PEOU→PU, PEOU→ATT, PU→ATT, and ATT→BI). Specifically, there are two key findings: (1) In TAM, PEOU acts as a key factor for the group with the lower level innovativeness; (2) regarding the group of relatively high innovativeness, the effect on ATT→BI has greater significance. Therefore, in response to the two groups of different levels of innovativeness, the suggestions are as follows.

For the low innovativeness group, strategists should strengthen the PEOU on home telehealth in order to decrease resistance to or rejection of home telehealth; effective methods include education, training, or medium promotions that would assist in understanding home telehealth. Physical contacts, demonstrations, interactive teaching, or following the instructions of trainers can acquaint potential users to home telehealth, thus avoiding possible problems and enhancing the level of acceptance. As for technology developers, ease of use is the priority, including the development of a user-friendly interface and features of easy operation for users, in order to enhance users' willingness to adopt the system and increase market share.

As for the high innovativeness group, attitude toward using home telehealth is the priority because it has a significant positive effect on acceptance. Therefore, improvement to individual attitudes toward use can enhance the acceptance of home telehealth.

Innovativeness acts as an antecedent to TAM, and the findings are below: (1) Innovativeness acts as an antecedent to PEOU, PU, and ATT, and there is a significant positive effect for all relevant indicators. However, among the effects of innovativeness on PEOU, PU, and ATT, the effect on PEOU is the most significant, followed by ATT and lastly PU. (2) Innovativeness and PEOU have significant positive effects on PU, while the effect of PEOU on PU is more significant. (3) Innovativeness and PEOU have significant positive effects on ATT, while the effect of innovativeness on ATT is more significant. (4) In the model, ATT has a significant positive effect on behavioral intention toward use (BI), which is consistent with the original TAM. (5) The model shows good fit, and thus, is a useful reference for future

studies. This result is consistent with that of Wilson and Lankton (2004), who suggested that future research should consider using other methods or constructs to develop an improved model.

Innovativeness refers to the degree that an individual or other units of adoption possesses regarding relatively early intentions of adopting new ideas, in comparison with social peers (Rogers, 1995). It possesses four important features: (1) a change in concept or material (including renovation and innovation), and such change is differentiated from the traditional group or individual cognition or behavior; (2) an ability to influence others in accepting an innovative idea or material; (3) contributions to problem solving or decision making for organizations or society; (4) the speed of acceptance for innovativeness as a function of time. Therefore, information, new ideas and concepts are accepted more quickly by individuals with higher innovativeness regarding changes to the original personal cognition or behavior, and further influencing surrounding groups, peers, or other individuals. Finally, this paper proposes suggestions regarding the relationship model for innovativeness as an antecedent to TAM.

Among the effects of innovativeness on PEOU, PU, and ATT, PEOU has the most significant effect, followed by ATT and PU is the last. The effects are all positive. In other words, a higher innovativeness leads to a higher PEOU of the home telehealth system, and a higher attitude toward its use. Hence, it is critical to enhance user innovativeness, and further elevate PEOU of home telehealth, and update and change the users' ideas regarding home telehealth. Such users may also influence others' acceptance of innovation, thus leading to increased acceptance and adoption of the home telehealth system.

Contrary to the traditional TAM (where PU is positively affected by PEOU), TAM includes innovativeness to explore its relationship with TAM. The results indicate that though both PEOU and innovativeness have significant positive effects on PU, PEOU has a more significant effect on PU. Thus, it is critical to improve the PEOU in order to enhance the users' PU of the system. Enhancing PEOU and PU is important for improving the attitudes toward using home telehealth, as the traditional TAM suggests. However, this study improves the attitude toward using home telehealth through individual innovativeness, and uses innovativeness as a key factor on attitudes toward using the home telehealth system.

These findings provide an important reference for industrial applications.

As the traditional TAM suggests that, attitudes toward using the home telehealth system can improve behavioral intentions for the use of home telehealth. Contrary to the traditional TAM, this study determines innovativeness as an antecedent to TAM, and regards it as an important element in making decisions on acceptance and adoption

of the home telehealth system.

Conclusion

The traditional TAM serves an acceptance model for user home telehealth. Different from traditional TAM studies, this study incorporates innovativeness to discuss the acceptance of home telehealth. The two key findings are below: (1) innovativeness is an antecedent to and moderator of TAM; (2) enhancement of attitudes toward using the home telehealth system is achievable by improving PEOU and PU, as the traditional TAM suggests. This study finds that individual innovativeness can enhance ATT. Updating and changing users' ideas regarding home telehealth may influence others' acceptance of innovativeness, thus, achieving acceptance and adoption of the home telehealth system and increasing market share. Therefore, to strengthen the high and low innovativeness groups, it is important to prioritize the high innovativeness group over the low innovativeness group.

The suggestions for the two groups are proposed as follows. Regarding the high innovativeness group, it is important to strengthen the attitude toward using home telehealth services, thus enabling rapid assimilation and adoption of information, new ideas and concepts. The adjustments to original cognition and behaviors can further influence surrounding groups and individuals.

Regarding the low innovativeness group, it is critical to decrease the resistance to and rejection of home telehealth services, and to strengthen the perceived ease of use through effective methods, such as education, training, or medium promotions, in order to increase the understanding of home telehealth system. In addition, other methods, such as physical contact, demonstrations, interactive teaching, and following instructions of trainers, can help potential users to understand the home telehealth system, thereby avoiding possible problems and enhancing levels of acceptance. As for technological developers, the key is the ease of use, such as user-friendly interface and features of easy operations, to enhance users' willingness to adopt the system and increase market share.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Gender differences in intention and relationship among factors of using Facebook for collaboration

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Received 10 May, 2011; Accepted 28 July, 2014

In Taiwan, in an effort to reduce the cost associated with educational training, enterprises have started to resolutely introduce the use of Facebook to support collaboration as part of employee training. Unlike previous studies investigating the effectiveness of conventional learning, the purpose of this paper was to discuss how various factors interconnect to affect Taiwanese employees' decisions regarding behavioral intention to use Facebook as support in collaborative learning situations. The expanded technology acceptance model (TAM) was applied. Employing structural equation modeling technology, the model was assessed using data collected from 385 participants by way of a survey questionnaire. Results show that social influence was the strongest factor influencing the use of Facebook to support collaboration and training adopting intention. Additionally, the findings also suggest that managers should anticipate that using Facebook to support collaboration in training may be perceived differently depending on the gender of the trainee, as we found that women are strongly influenced by co-workers and supervisors in these matters. Implications both in theory and practice are discussed, based on the findings.

Key words: Facebook, technology acceptance model, collaboration, gender.

INTRODUCTION

Technologies are rapidly changing the way organizations train their employees (Welsh et al., 2003). Organizations are increasingly attempting to use various media to support employee training, such as web-based or computer-based options. Dawson (2008) recommends that educators pay attention to trainee recognition or rejection of social software, as it may increase Opportunities for learning. Sigala (2007) indicates that the

advent of social software presents opportunities for student-centered personalized learning environments. Through communication and collaboration, employees learn from one another and construct meaningful knowledge. One example of such a personalized learning environment could be Facebook, the web-based social networking tool, the use of which has been absorbed into the daily lives of many of its users, and has become a

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pervasive web-based medium. Many of us are attached to it as a convenient channel for personal communication. As such, it has become necessary for organizations to review how the technology that is already available to their employees can be utilized to make communication and collaboration in the workplace more convenient and affordable than ever before.

One way of using Facebook to support collaborative learning would be to allow a group of employees to use an online discussion forum to share ideas, resources or materials. Using Facebook as a tool to assist in learning is a critical theme in this study and a review of prior studies provides a theoretical foundation for hypotheses formulation. Facebook is extremely popular and very highly rated for acceptance by individual users. Yet, despite this fast increase in Facebook usage, there is a lack of understanding regarding the factors driving Facebook collaboration adoption.

Numerous theoretical models have been proposed for understanding the factors impacting the acceptance of information technologies (Davis, 1989; Venkatesh and Davis, 2000). Based on these studies, the technology acceptance model (TAM) was found to be the most influential in explaining IT adoption behaviour. This paper focuses on employees' perception, by applying the TAM model to examine relationships that affect usage of Facebook to support collaboration.

A survey was conducted among employees in Taiwan to investigate learners' intention to use Facebook in collaboration specifically during their training period. In this study, an adoption model for the use of Facebook in supporting collaborative learning was proposed and then evaluated. Two additional factors were added to the TAM - social influence and flow. The next section offers a brief introduction to the use of social software in education, an overview of the development of Facebook and behavioral intention to use Facebook in collaboration.

RELATED RESEARCH

Social software and education

While social software can be used to facilitate learning, it mainly supports social activities and informal educational interaction between peers for sharing purposes (Gillet et al., 2008). Literature of social software shows some studies linked to collaboration and some in structural formatting such as uploading photos and writing comments. Boyd and Ellison (2007) defined social software as computer-mediated interaction that allow users to (1) construct a public or semi-public profile in a bounded system, (2) articulate a list of other users with whom they share a connection and (3) view and traverse their list of connections and those made by others in the system.

Users of social software are mostly young people with

some degree of interaction outside of the classroom. The lives of the Internet generation (those born after 1991) have obviously been affected tremendously by social software, shaping how they spend their time and also shaping their minds, enriching their knowledge, and conditioning their behavior (Gillet et al., 2008). Users still interact through more formal educational activities and by following and commenting on academic and social issues, dilemmas and disappointments faced while pursuing university education (Selwyn, 2007). Using social software as a tool to assist in learning is an attractive and interesting proposition to young users and should provide an additional opportunity to acquire knowledge, support project-based learning in higher education and smooth learning processes (Gillet et al., 2008).

Facebook

From a traditional education perspective, it is important to use education-based technology with underlying pedagogical principles in mind. Care should be taken to create purposeful application of learning strategies (Mejjias, 2005). In fact, members in the field of education are shifting their focus to examine technology that the traditional education system has been largely unable to develop further (Gillet et al., 2008).

Boyd and Ellison (2007) stated that social software developed first from Six Degrees.com in 1977 followed by Asian Avenue, Migent, MySpace, YouTube and Facebook. Facebook acquired millions of registered users in a short period of time. Facebook was launched in 2004 as Harvard-only social network and then expanded to include people world-wide who share similar interests (Cassidy, 2006). Facebook quickly evolved to become part of users' daily lives. Facebook has many collaborative functions such as peer feedback, and interaction tools that could be adapted for educational purposes (Mason, 2006).

Behavioral intention to use Facebook for collaboration

Facebook provides satisfactory tools for educational purposes such as message writing, information sharing platforms and discussion forums. Sigala (2007) stated that social software supported critical thinking, collaborative learning and communication through activities between partners who are working together. Users can use Facebook to promote connectivity, collaborative learning, knowledge acquisition and information exchange. In this way, users of Facebook are able to combine exiting material to share and use in partnership with others in a collaborative approach to knowledge acquisition.

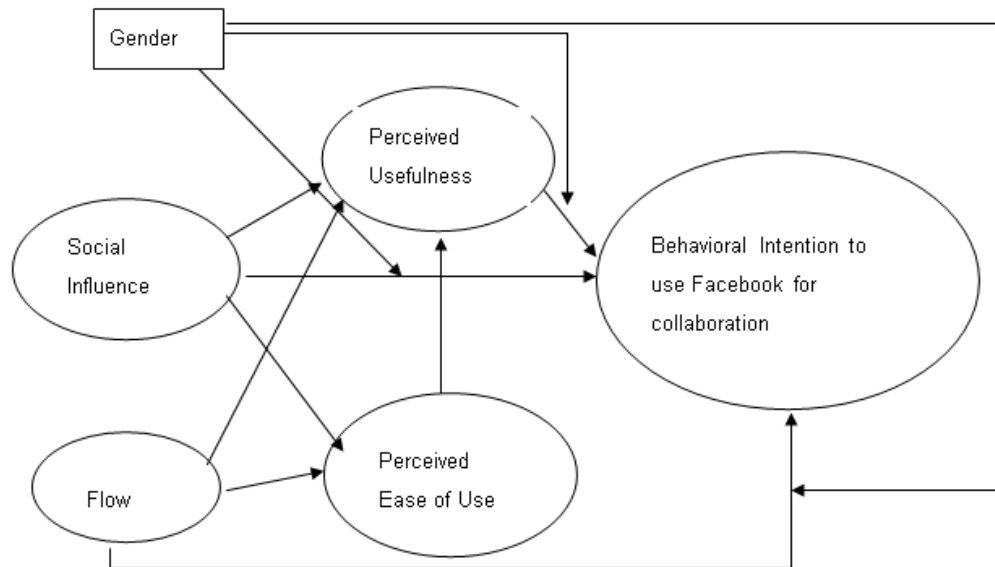


Figure 1. Research model

Theoretical framework and the research model

Technology acceptance model (TAM)

Technology acceptance is a popular stream of information system research (Hu et al., 1999; Venkatesh et al., 2003; Vessey et al., 2002). There have been several models explaining technology acceptance, particularly since the 1980s: Diffusion of innovation theory (Roger, 1995); social cognitive theory (Bandura, 1986) and the theory of reasoned action (Fishbein and Ajzen, 1975). The technology acceptance model (TAM) has received much attention. It has been used to predict users' behavior based on their attitude and intention. Particularly important user parameters are perceived usefulness and perceived ease of use (Dillon and Morris, 1996).

The TAM was adapted from the theory of reasoned action (Fishbein and Ajzen, 1975) and developed to examine technology adoption and users' behavioral intention in adoption of technology in the workplace. Research in this field has demonstrated that perceived usefulness and ease of use can be a significant predictor of user intention and behavior adoption regarding new technology (Hasan and Ahmed, 2007; Lee and Kim, 2009; Moon and Kim, 2001; Karahanna and Straub, 1999; Lu et al., 2009; Luarn and Lin, 2005).

Model development and hypotheses

Assuming that choice is voluntary, people adopt Facebook (or any other technology) because they believe it will be useful in improving their efficiency and effectiveness when performing tasks (Venkatesh et al., 2003). Pedersen

and Ling (2003) pointed out that the traditional behavioral intention models in information systems research may be modified and extended when they are applied to the study of adoption of internet services. This study used users' behavioral intention to adopt Facebook when collaborating as a dependent variable. The research model consists of five latent variables. Perceived usefulness, perceived ease of use, social influence, and flow are four variables used to explain the structure of behavioral intention (dependent variable). The subjects developed related to Facebook were based on the literature review of acceptance and supporting theories. The research model in this study is shown in Figure 1.

Perceived usefulness

Perceived usefulness is the extent that an individual believes that using an information system will enhance his or her productivity (Davis, 1989). Moon and Kim (2001) stated perceived usefulness is the extent that an individual perceives attention related to the interaction within the information system. Empirical studies by Venkatesh and Davis (2000) concluded that a causal relationship exists between perceived usefulness and perceived ease of use. These are two constructs of TAM that influence users' attitudes toward technology use and in turn affect behavioral intention to use technology (Cheung and Huang, 2005; Liaw et al., 2007).

Using Facebook for assistance in group learning situations can be considered to be a natural extension of computer use. Venkatesh and Morris (2000) indicated that men consider perceived usefulness to a greater extent than women in making their decisions concerning

usefulness and productivity-related factors in adopting new technology, and men are more driven by instrumental factors than women. Previous research (Ong et al., 2004; Venkatesh and Morris, 2000; Venkatesh et al., 2003) revealed that men consider perceived usefulness to a greater extent. This would suggest that an individual's intention to use Facebook to support group learning has an influence on his or her perceived usefulness of the system. We also expect that gender has an influence on perceived usefulness and behavioral intention to use Facebook for collaboration. Based on the above literature, we proposed the following hypotheses:

H1: Perceived usefulness positively affects intention to use Facebook for collaboration.

H2: Perceived usefulness influences intention to use Facebook collaboration more strongly for men than women.

Perceived ease of use

Perceived ease of use of technology is the extent that an individual perceives that using an information system is free of effort (Davis, 1989). Perceived ease of use and perceived usefulness are two variables affecting users' behavioral intentions in using technology. Venkatesh and Davis (2000) regarded the relationship between perceived ease of use and perceived usefulness as being equal, so the easier the system is to use, the more useful it is. Many studies have confirmed this effect of perceived ease of use on perceived usefulness (Gallego et al., 2008; Lee et al., 2007). Ong et al. (2006) found that men perceived more usefulness and ease of use in e-learning. Extensive research has further confirmed the effect of perceived ease of use to intention use (Al-Somali et al., 2009; Chang and Wang, 2008; Stoel and Lee, 2003). Therefore, we proposed the following hypotheses:

H3: Perceived ease of use positively affects perceived usefulness in using Facebook for collaboration.

Social influence

Vandenbosch and Huff (1997) pointed out that perceptions of technology are socially constructed to some extent. Social influence is exerted when a person values others' belief that he or she should adopt new technology (Venkatesh et al., 2003). Prior studies note that social influence is a significant factor in an individual's intention to use new technology (Thompson et al., 1991; Venkatesh and Davis, 2000). We expect that social influence is a significant determinant of behavioral intention in using Facebook to support collaborative learning. Prior researches (Bhatti, 2007; Horst et al., 2007) demonstrated the

significant influence on perceived usefulness. Karahanna and Straub (1999) stated that perceived usefulness is determined in the order of importance set by social influence, exerted by a supervisor's usage of e-mail. Furthermore, social influence of those using e-learning systems influenced behavioral intention to use e-learning more strongly in men than in women (Wang, 2008). A study by Venkatesh et al. (2003) showed that women have a stronger relationship between social influence and behavioral intention. Thus, we hypothesize as follows:

H4: Social influence positively affects intention to use Facebook for collaboration.

H5: Social influence positively affects perceived usefulness in using Facebook for collaboration.

H6: Social influence positively affects perceived ease of use in using Facebook for collaboration.

H7: Social influence influences intention to use Facebook for collaboration more strongly for women than men.

Flow and the theoretical model

Most of the TAM research proposes extrinsic-motivation perspective and cannot fully reflect what motivates e-learners. This requires research into intrinsic motivational factors (Martinez et al., 2008; Ong et al., 2004).

Flow is a positive psychological concept related to intrinsic motivational factors. Flow is defined as the holistic sensation that people feel when they act with total involvement (Csikszentmihalyi and Csikszentmihalyi, 1988). The flow concept is that when people are absorbed in an activity, their awareness is narrowed to the activity itself; they lose self-consciousness, and they feel in control of their environment (Csikszentmihalyi and Csikszentmihalyi, 1988). The concept of flow could also be a metric of online users' intrinsically enjoyable experience: "the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis et al., 1992). In this way, using Facebook in collaborative learning situations could be defined as a form of enjoyment.

In web-based research using TAM model as theoretical background, Venkatesh (2000) found that there is a relationship between flow and perceived ease of use. Research by Agarwal and Karahanna (2000) shows perceived usefulness of the system is influenced by flow. Research in intention to use (Venkatesh, 2000) has explored how perceived intrinsic enjoyment has a strong relationship with TAM. Venkatesh et al. (2003) stated that men are strongly influenced by attitude summation of intrinsic cognitive beliefs similar to perceived enjoyment toward using the new technology and women are influenced by social norms and perceived behavioral control. Men are more sensitive to self-motivation or self-

satisfaction than women (Herring, 1999; Weatherall, 1998). Hwang and Kim (2007) concluded that men have greater perceived enjoyment than women in the context of flow theory. According to Koufaris (2002), flow includes perceived enjoyment, concentration, perceived control, and curiosity. Therefore, we expect flow will influence intention to use Facebook for collaborative learning more strongly in men than women. Based on the above research, we propose the following hypotheses:

H8: Flow positively affects intention to use Facebook for collaboration.

H9: Flow positively affects perceived usefulness in using Facebook for collaboration.

H10: Flow positively affects perceived ease of use in using Facebook for collaboration.

H11: Flow influences intention to use Facebook for collaboration more strongly for men than women.

METHOD

Participants

In this study, Facebook supported collaboration was implemented in an organization in Taiwan. This investigation used survey methodology and data were collected from a sample of online questionnaires filled out by employees who participated in a training program. A questionnaire was distributed to 385 participants. There was a fairly even distribution of gender (59.7% males and 40.3% females). Participants were asked to complete a questionnaire including demographic information.

Participants were required to do a group project using Facebook as a shared virtual workspace to support their collaboration. Participants in each group were encouraged work collaboratively as often as possible. Instructors would offer comments while visiting groups in order to check participation.

Measures

To ensure the content validity of the scales, the items selected must represent the concept about which generalizations can be made. Therefore, previously validated items adapted from prior studies were used. Instrument development included reviewing the literature in order to identify measures for each construct: perceived usefulness and perceived ease of use (Davis, 1989), Flow (Moon and Kim, 2001), social influence (Ajzen and Fishbein, 1980) and behavioral intention (Agarwal and Karahanna, 2000). A seven-point Likert-type scale ranging from strongly disagree (1) to strongly agree (7) was used to answer the questions about the five constructs.

Analysis

Structural equation modeling (SEM) is a statistical approach to examining the causal relationships and testing hypotheses between latent and latent variables in a research model (Hoyle, 1995). The main advantage of SEM is that it can estimate a measurement and structure model and achieve a good model fit after analysis and modification (Ngai et al., 2007). Boomsma (1987) stated that the

smallest sample size should be higher than 200 if the maximum likelihood method is used to estimate the parameters. The sample size in this study is 385 and is sufficient. After data were collected from an online survey, they were tested using AMO 7.0 and SPSS 15.0. The measurement model was tested for reliability and validity of each construct using confirmatory factor analysis.

Measurement model

The measurement model contained five constructs with 25 items. Some constructs needed to be revised after the initial analysis of the measurement model. Five constructs with 17 items were retained for further analysis. The measurement model was evaluated in terms of reliability, the convergent and discriminant validities examined by using the confirmatory factor analysis (Table 1 and 2).

Reliability was examined using Cronbach's alpha values. Cronbach's alpha value for all items is .914. Cronbach's alpha value for each construct is greater than 0.8 in Table 1. These statistics are acceptable.

Convergent validity is to which degree two or more items measure the same concept (Bagozzi and Phillips, 1982). The convergent validity of measurement item was evaluated in terms of the significance of t-statistics, factor loadings, composite reliability and average variance extracted (AVE). All the t-statistics of the items were significantly greater than the critical ratio value of 1.96 (Bagozzi et al., 1991). All items except PEU4 are greater than the recommended factor loading value of 0.70 (Hair et al., 1998). Composite reliability (CR) measures the internal consistency of observed variables in the measurement model (Chen et al., 2004). Moreover, all the composite reliabilities for each construct are greater than the recommended value of 0.60 (Diamantopoulos and Siguaw, 2000). All the AVEs are greater than the recommended value of 0.5 (Fornell and Larcker, 1981). Thus, all these statistics in Table 1 indicate that the convergent-validity requirement is acceptable.

The average variance extracted is used to measure the discriminant validity of each construct. AVE is acceptable when it is greater than 0.5 (Fornell and Larcker, 1981). Discriminant validities are assessed by examining that the square root of the average variance extracted (AVE) by a construct (latent variable) from its indicators and should be at least 0.7 (AVE > 0.5). Table 2 shows the correlations among different constructs and the square root of the average variance extracted (AVE) on the diagonal. Moreover, the square root of AVEs on the diagonal should be greater than that construct's correlation with other constructs, respectively (Fornell and Larcker, 1981). All constructs (latent variables) satisfy these conditions: The square root of the AVEs is at least 0.7 and is much greater than all other cross-correlations for samples. Thus, we conclude these statistics show that the Discriminant-validity is acceptable. Data are shown in Table 2.

Structural model

Structural equation modeling was conducted with AMOS 7.0 to examine how the research model fit the data. The structural model shows the relationship between the constructs and specifies the constructs that are related to each other (Hair et al., 1998). Table 3 shows the fit indices are acceptable. The indications of a good fit are below. The ratio of χ^2 to degrees of freedom = 1.027, GFI = 0.971, NFI = 0.980, CFI = 0.999, AGFI = 0.954, RMR = 0.052, and RMSEA = 0.008. These statistics are all within the recommended values (Bentler, 1990; Hair et al., 1998). This suggests that the model provides a reasonably good fit to the data.

Table 1. Measurement model.

Dimensions	Factor loadings	Composite reliability	AVE	t-statistics	Cronbach Alpha
Social influence		0.911	0.721		0.913
SI1	0.766			17.446	
SI2	0.786			18.139	
SI3	0.911			22.910	
SI4	0.921			23.318	
Flow		0.893	0.807		0.869
F3	0.924			22.167	
F4	0.872			20.418	
F5	0.724			15.835	
Perceived ease of use		0.881	0.662		0.884
PEU1	0.905			22.002	
PEU2	0.915			22.492	
PEU3	0.878			21.099	
PEU4	0.469			8.563	
Perceived usefulness		0.907	0.766		0.910
PU1	0.875			20.688	
PU2	0.891			21.070	
PU3	0.870			20.103	
Behavioral Intention		0.910	0.772		0.895
BI1	0.874			19.496	
BI3	0.845			18.589	
BI4	0.858			19.351	

** Correlation is significant at the 0.01 level (2-tailed). *the square root of the AVEs.

Table 2. Discriminant validity.

	SI	Flow	PEU	PU	BI
SI	0.849*				
Flow	.390(**)	0.898*			
PEU	.409(**)	.355(**)	0.813*		
PU	.388(**)	.353(**)	.413(**)	0.879*	
BI	.485(**)	.387(**)	.454(**)	.414(**)	0.860*

Table 3. Statistics of model fit measures.

Model fit measure	Recommended value	Model value
1. χ^2 /d.f.	<3	1.027
2. GFI	>0.9	.971
3. NFI	>0.9	.980
4. CFI	>0.9	.999
5. AGFI	>0.9	.954
6. RMR	<0.1	.052
7. RMSEA	<0.05	.008

RESULTS

Figure 2 shows each construct of the model with the standardized path coefficients and respective significant levels. The results of this study showed that perceived usefulness, social influence and flow were found to be significant predictors of behavioral intention to use Facebook to support collaboration in training. Table 4 indicated that women = 0.518*** greater than

men=0.370*** in predicting social influence in using Facebook supported collaboration. Social influence is a much stronger predictor in all factors. Additionally, summary of the testing results from Table 5 shows perceived ease of use has a positive influence on perceived usefulness. Social influence has a positive influence on perceived

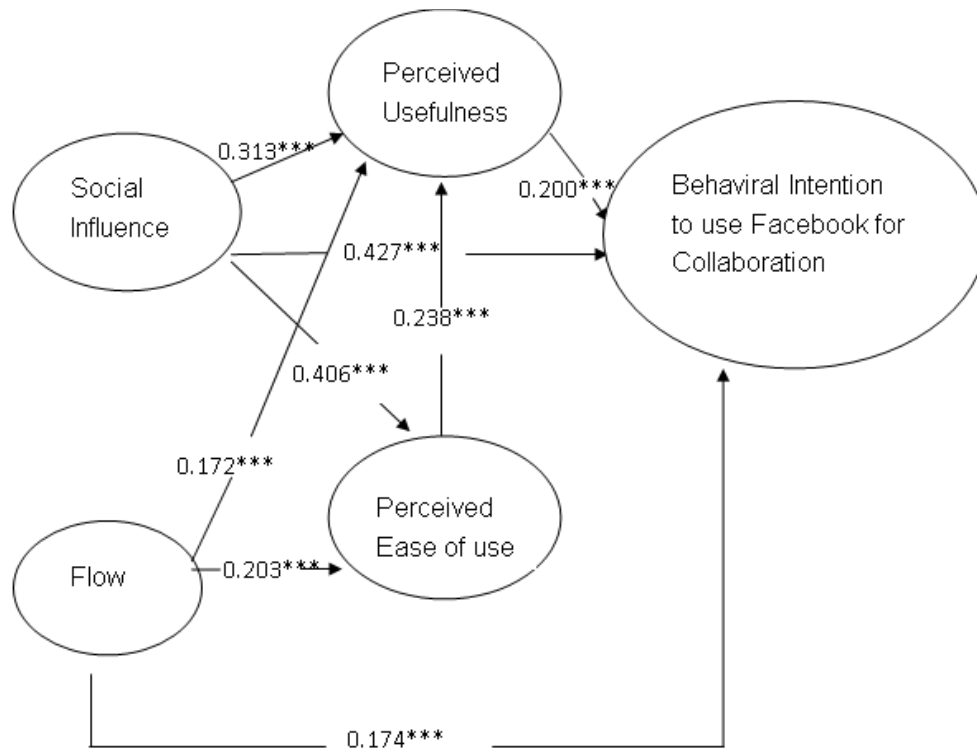


Figure 2. The research model's test results ***P<0.001.

Table 4. Gender differences in relationships of PU-BI, SI-BI and FLOW-BI.

	Entire sample	Men	Women
	β	β_m	β_w
PU-BI	0.200***	0.148	0.247
SI-BI	0.427***	0.370***	0.518***
FLOW-BI	0.174***	0.210***	0.095

***P<0.001.

ease of use and perceived usefulness. Flow has a positive influence on perceived ease of use and perceived usefulness.

IMPLICATION AND CONCLUSION

This study confirms the significance of TAM-research findings. Perceived usefulness and perceived ease of use are important variables affecting the acceptance of using Facebook for collaboration. This study also makes a contribution by extending the TAM model. Social influence is found to be the strongest determinant of use intention. This shows that workplace opinions are very important to

Table 5. Summary of testing results.

	Relationship	Hypothesis	Result
Main effect			
H1	PU-BI	Positive	Supported
H3	PEU-PU	Positive	Supported
H4	SI-BI	Positive	Supported
H5	SI-PU	Positive	Supported
H6	SI-PEU	Positive	Supported
H8	FLOW-BI	Positive	Supported
H9	FLOW-PU	Positive	Supported
H10	FLOW-PEU	Positive	Supported
Gender			
H2	PU-BI	Men>Women	Not significant
H7	SI-BI	Women>Men	Supported
H11	FLOW-BI	Men>Women	Not significant

BI=behavioral intention; PU= perceived usefulness; PEU= perceived ease of use; SI= Social Influence.

employees when adopting new technology. Employees believed that using Facebook can help complete job-related tasks and can support collaboration with co-

workers. Employees also enjoyed using Facebook to support collaborative learning when a sociable environment was encouraged (this sociable environment included peers and a supervisor.)

Karahanna and Straub (1999) indicated that supervisors may encourage employees to use technology to increase knowledge. The results of this study show employees value the opinions of a supervisor as important and serious. Social influence is a key element of success in using Facebook in training, as it promotes both perceived usefulness and perceived ease of use. Results pointed to the positive effect of gender differences and social influence on intention to use Facebook for collaboration. Note that women are affected more strongly by social influence on intention to use Facebook for collaboration.

The findings also support the positive effect that perceived usefulness has on adopting Facebook to support collaboration during training. The other result of this study is perceived usefulness as explained by perceived ease of use and social influence.

The perceived usefulness of Facebook in collaboration can be enhanced by promoting perceptions about ease of use of Facebook during collaboration based on the opinions and beliefs of influential group members. This finding supported Karahanna and Straub (1999); Bhatti (2007) and Horst et al. (2007), in which perceived usefulness could be influenced by a supervisor's commitment. The results also match the conclusion of Pituch and Lee (2006) that perceived ease of use has a positive effect on perceived usefulness. Therefore, enhancing the degree of ease of use and social influence will be a critical factor in perceived usefulness of adopting Facebook to support collaboration. In order to increase effectiveness of Facebook supported collaboration, it is important for users to perceive that the technology is useful and will enhance their job performance or productivity.

The result of this study also demonstrates extrinsic and intrinsic motivations of employees using Facebook to support collaboration. They are not only expecting an easy to use and otherwise useful platform, but also want to experience enjoyment in the context of flow theory. To support collaboration in technology, employees required a powerful communication and entertainment platform. Facebook provided employees with a rich entertainment function while also supporting their workplace collaboration. Adoption is only a first step in using Facebook supported collaboration. It can be used successfully in training. However, there is still a need to investigate further.

This study made a contribution by examining the effect of TAM factors on Facebook supported collaboration and how it might be moderated by the gender of employees in Taiwan. The results of this study have implications for those interested in using social software to support training activities.

Limitation and further research

As with any research, this study has some limitations that should be considered. First, the findings and implications presented here were from a single study that included a specific group in Taiwan. Caution is needed to avoid generalization of findings to other user groups or different industries. Second, this study focused on using hedonic-oriented social software for an educational training situation. The results should not be applied to administration or communication situations. Further research could be conducted to investigate using Facebook to support collaboration between users from different cultural backgrounds or for different purposes.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Effect of executive board and family control on audit opinion

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Received 25 November, 2011; Accepted 5 August, 2014

In this study the relation and effect of corporate governance on audit opinion of CPAs is investigated. The companies investigated are listed in Tehran Stock Exchange and are selected using the systematic elimination method. They are 104 companies. The time period is 2008-2010. The statistical methods used are logistic regression and Wald test. The data were collected from the companies' annual financial statements and independent auditors' opinion. The results indicated a significant relation between the ratio of the executive board and type of independent auditors' opinion. Therefore, in companies with higher ratio of executive board members, the right opinion of an independent auditor is taken along with an explanatory paragraph. Moreover, there was a positive and significant relation between family control and type of CPA's opinion; that is, if a company has higher rank in terms of ownership, then the independent auditor's opinion will have a fewer number of paragraphs and vice versa; in companies with more stockholders dispersion, the independent auditor's opinion is unqualified and has more audit paragraphs. Adding the corporation's size to the research model, the research results were approved.

Key words: Audit opinion, executive board, family control.

INTRODUCTION

Today, there is no doubt about the significance and role of corporate governance in companies' success since this topic has gained more importance due to the recent events and financial distresses of companies. By investigating the causes and pathology of collapses of large companies, which causes them serious losses, especially their stockholders, it is seen that such events

occur due to the weakness in their corporate governance systems (Ghirmai, 2011; Hesiang and Li, 2010). Studies show that corporate governance could promote companies' standards, provide and equip investments and investors, and improve executing issues; it is also one of the major elements in improving companies' economic efficiency, since it oversees the relations

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among stockholders, board members, managers, and other shareholders (Chen et al., 2007; Derek and Zhein, 2011). CPAs as reliable and expert individuals are representatives of stockholders that confirm the correctness and honesty of information published by managers. They have independence and assess managers' performance and their reports; they report any important and meaningful departure from the accepted principles of accounting and management, and the constraints in providing documents and information by managers to the stockholders (Watts and Zimmerman, 1986; Fama et al., 1983; Aslani, 2002). This prevents any moral hazard among stockholders and managers, and increases the reliability of companies' financial statements (Hasasyeganeh, 2008; Muatz and Sharaf, 1961, Nikkhakazad, 2005). The corporate governance system, due to its supervisory components, could be related to the auditor's opinion type; for instance, the dispersed stockholders have different impacts on CPAs' behavior compared to the combined stockholders (Ghosh et al., 2010; Chan et al., 2007; Hungchan et al., 2010).

The current study aims to investigate the effect of the executive board members and family control in companies on CPAs' opinion.

LITERATURE REVIEW AND DEVELOPMENT HYPOTHESES

Salaki (2009) concluded in a study that there is no significant difference among internal auditors and the ratio of the non-executive board members and information asymmetry criteria. But there is a negative significant relation between the family investors ownership percentage and information asymmetry. Shoja'e (2010) stated that family stockholders in combined stockholders and supervising their efficiency have significant reduction effect on sample member companies' cost of debt while audit quality does not have such an effect.

Ghorbani and Golmohammadi (2010) mentioned that the quality of audit is effective on all three levels of income manipulation. Namazi et al. (2010) found out in their studies that there is a positive weak relationship between audit size and time of auditing with earnings management. Nonahal et al. (2010), in their study on companies active in Tehran Stock Exchange, concluded that the stability ratio of the discretionary accrual items in companies with higher quality CPAs is higher; therefore, there is more reliability concerning their accrual items. Ibrahim (2001) indicated that the auditor's skill has a positive effect on the process effectiveness and improving the auditors' informing performance. Also, the results showed no proof that the client might affect the independence of the auditor or the auditors might allow the major clients to have more authority in the earnings report. Ibrahimikodlor and Seyedi (2008) concluded that

an auditor has a relationship with the discretionary accrual items and the CPAs opinion does not have an effect on the discretionary accrual items. Johl et al. (2007) investigated the relationship between the earnings management and the auditors' opinion in Malaysia. They found out that the earnings management level in companies where their audit is carried out by world's 5 big auditors is different from companies whose audit is not carried out by these institutions. Francis and Michel (2005), in their studies, concluded that companies with more accrual items intend to employ auditors with higher quality and ranks. Nagy and Carcello (2004) and Falateh (2006) believe that auditors with more time for auditing have higher quality opinions. Chambers and Payne (2008) found out that higher quality audit and employing Sarbanes-Oxley law improve reliability of the accrual items. Chen et al. (2005), in an investigation on Taiwanese companies, concluded that earnings management had occurred in them and there is a significant reverse relationship between earnings management and audit quality. Ahmad et al. (2011) investigated the impact of auditors, board members and family stockholders on aggressive financial reporting. They found out that there is a significant relationship between the CPA's independence and discretionary accrual items. They reported that this relationship was weak in years prior to the issuance of Sarbanes-Oxley law. Also they found that companies with weak governance system have more discretionary accrual items.

Tendello and Vanstraelen (2008), in their study on European companies, reported that audit quality and earnings management are significantly related. Kamwah and Ferdinand (2008), in their investigation on "Lavantal" auditing company's bankruptcy, found out that the clients of this auditing company had more discretionary accrual items than other auditing companies' clients. Bartov et al. (2000) found out that the unqualified audit opinion has a direct relationship with the companies' amount of discretionary accrual items. However, Bradshaw et al. (2001) reported that companies with qualified opinion had more discretionary accrual items than companies with unqualified discretionary accrual items.

According to the results obtained from researches carried out in countries with different legal and economic conditions from Iran, and because there is no work on the effect and relationship of corporate governance components in Iran with audit opinion, this study focuses on the effect of corporate governance components, such as the effect and role of executive board in companies and the role of ownership and stockholders combination on CPAs' behavior and opinion in Iranian companies.

The following hypotheses are formed: There is a significant relationship between the companies' ratio of executive board members and audit opinion. There is a significant relationship between the companies' ownership concentration rank and audit opinion.

RESEARCH METHODOLOGY

Statistical population and sample

This is an applied (practical) research which investigates the correlation of variables, and since it deals with past events, it is also ex-post facto. Therefore, the statistical population of this research consists of the companies listed in Tehran Stock Exchange in 2003-2008. In order to extract the required data, financial information especially financial statements, CPAs' reports and notes of financial statements were available. In this study, the systematic elimination was used as the sampling method. Companies included in the statistical population meeting the following features were selected as samples, and the rest were eliminated:

1. Companies with steady activity and whose stocks were traded during the research period.
2. Companies which are not investing firms and financial and insurance intermediaries.
3. Companies whose fiscal year is February.

By applying the companies' selection terms, 104 companies were selected as samples whose financial information was used in the analyses.

Research model

Considering the research hypotheses, the research model was formulated as follows:

$$\text{Audit opinion} = \alpha_0 + \beta_1 * \text{EXE BOARD} + \beta_2 * \text{FAM CONT} + \beta_3 * \text{CONT VAR} + \varepsilon \quad (\text{Equation 1})$$

Where, **audit opinion** is the CPA's opinion, **EXE BOARD** is the ratio of the executive board members, **FAM CONT** is the family control, and the **CONT VAR** refers to control variables, which include auditors' characteristics, companies' financial characteristics, and auditors' problems.

Variable definitions and their measurement and collection method

CPAs' opinion

Based on Iran's audit standards, CPAs must present their reports and financial statements to companies' stockholders; they should frankly give their opinion on all the financial statements. If a company, in 4 years out of 6 years, has qualified audits (with explanatory paragraph), it receives number "1"; if otherwise, number "0" is allocated to it. To do so, the CPAs' reports attached to the companies' financial reports are considered.

The executive board ratio

According to Iran's trade law, companies and stockholders can elect companies' board members biennially. These members except for the CEO, who is executive and full-time, could be from inside or outside of the company. The board members who are active inside the company are referred to as employed, executive and full-time members. In order to measure this ratio, the number of executive board members is divided by the total number of the company's board members. The figure for this index is derived from the 6-year average activity report of each company. According to Iran's trade

law, presenting annual activity report by board members in addition to the financial statements and auditor's report is mandatory.

Family control

Family control refers to the presence of family stockholders in the company's stockholders combination, and the family stockholder is determined according to the Iran Stock Exchange Organization's regulations in which the amount of free float is exchanged publicly, and includes all the block stocks related to a holding. In order to obtain the index and rank of each company, the Herfindahl-Hirschman Index (HHI) was used. It is calculated using the following equation:

$$\text{HHI} = \sum (\text{pi} / \text{p} * 100)^2 \quad (\text{Equation 2})$$

The above index is obtained from the sum of the root of stocks percentage belonging to companies' stockholders. As this index increases, the ownership concentration amount increases, and reaches its maximum value when all the stocks belong to one person and are equal to 10000 units. If the ownership structure is dispersed and each stockholder has equal share, the HHI is minimum and equal to $N/10000$.

Variable control

The CPAs' characteristics

Size of audit institutions: The size of institutions is calculated based on the number of personnel and employees.

The auditor's knowledge about the client's industry: If, during the last 6 years, the auditor had had any experience of auditing in the client's industry, it is given number "1"; if otherwise, number "0" is allocated to it. The audit firms' size is disclaimed by the Iranian Association of Certified Public Accountants which is obtained by reviewing the reports presented by audit firms.

The companies' financial characteristics

Leverage is the company's 6-year average of total liabilities to total assets ratio. Size is the logarithm of 6-year average sales.

Auditors' special problems

The nature of auditing is intended. Two components were considered in this research: The 6-year average of company's inventory and assets ratio. The inventory is both diversified and different parts of a company are engaged in it. Therefore, it is more sensitive. It includes the 6-year average of company's receivables to assets ratio.

All of the above cases are derived from the companies' annual financial statements.

Descriptive statistics results

The results from the descriptive statistics are shown in Table 1. The results show that about 61% of companies had qualified opinions. The average ratio of executive board was 45% and in companies with qualified opinion, this ratio was 61%. The family ownership

Table 1. Descriptive statistics of variables.

Variance of observation	Mean of observation	Variables	Type of variable
0.115	0.481	Executive board ratio	dependent
0.097	5872	Ownership concentration ratio	
0.242	68	Audit firm size - number	
0.191	0.611	Acquaintance to client	Controls
0.151	0.629	Leverage ratio	
0.274	3541	Corporation size	
0.175	0.368	Inventory ratio	
0.319	0.216	Accounts receivable ratio	

Table 2. Information about the first hypothesis and the results of the Wald Test.

Confirm/reject	EXP(B)	sig	Wald	S.E	B	Variables
Confirm	0.0416	0.0291	3.712	1.266	2.348	Executive board ratio
Reject	1.000	0.441	0.595	0.000	0.000	Audit firm size - number
Reject	1.015	0.621	0.244	0.031	0.015	Acquaintance to client
Confirm	0.029	0.041	4.188	1.243	2.545	Leverage ratio
Confirm	0.0406	0.0423	4.050	2.439	2.098	Corporation size
Confirm	0.0309	0.037	3.850	2.012	2.805	Inventory ratio
Reject	6.487	0.246	1.345	1.612	1.870	Accounts receivable ratio

concentration rank in companies with qualified audit opinion was 7349 which was higher than the average 5872. That is, the family ownership in such companies is higher and the majority of the companies' stocks are owned by limited natural and legal personalities who have extensive and accurate supervision on CEO and board's performance. The size of such companies is larger than the average size, and also their auditors are well-known and more experienced among Iranian Association of CPAs. Moreover, about 70% of their capital is provided using banks' facilities. The inventory percentage of such companies is higher than the average 36% and is around 47%; and since they almost have the monopoly of their services in Iran (they are governmental or quasi-governmental), they have cash sale market and their receivables percentage is not large and is 5% lower than the companies' average.

Hypothesis test results

Table 2 presents the information about the first hypothesis and the results of the Wald test.

In order to examine the relationship and effect of each independent variable and control on auditor's opinion, the logistic regression was used. As it is shown in the table, the relationship between the executive board ratio, companies' size, and inventories average ratio with auditor's opinion is directly and positively confirmed. That is, each sign of variables and also Wald's statistic for these variables approve their relationship with type of auditors' opinion (their sign level is less than alpha error acceptance level of 5%). But the leverage has a negative, inverse relationship and effect on the type of auditor's opinion. Which means by increasing the company's leverage, its effect on auditor's opinion type would be significant and inverse. Confirming the relationships between the above-mentioned variables with CPA's opinion type means that the

success chance in issuing opinions by CPAs is approved. For example, when the ratio of the executive board is higher in a company, it is expected that its CPAs opinion should be different from a company in which this ratio is lower. Hence, companies with different size, leverage, or inventory could have different CPA's opinion. As shown in Table 2, there is no relationship between size of auditing institutions, the acquaintance level with the client's industry, and clients' receivables with type of auditors' opinion; also companies could not have different auditor's opinion from this point of view.

In the research's second hypothesis, investigating the auditor's opinion relationship with family ratio in companies' ownership, auditor and client's size, companies' leverage, receivables average, and their inventories, using the Wald test and logistic regression, the following results were obtained, as shown in Table 3.

As shown in Table 3, the relationship of family ratio in companies' ownership, companies' size, and inventories averages with the auditor's opinion type is confirmed; the sign level of each variable and also the Wald's statistic for each variable approve their relationship with the auditor's opinion type (their sign level is less than alpha error acceptance level of 5%). But the leverage has a negative, inverse relationship and effect on the auditor's opinion type. The table shows that the effect of auditor's size, acquaintance level with client's industry, and client's receivables average on the auditor's opinion type is not accepted; which means that any increase or decrease in these factors does not affect the CPA's opinion, whether qualified or unqualified.

RESULTS AND DISCUSSION

Based on the theoretical principles, it is expected that

Table 3. Information about the second hypothesis and the results of the Wald Test.

Confirm/reject	EXP(B)	sig	Wald	S.E	B	Variables
Confirm	0.056	0.031	3.178	0.266	0.326	Ownership concentration ratio
Reject	1.000	0.416	0.435	0.000	0.081	Audit firm size - number
Reject	1.015	0.621	0.244	0.031	0.075	Acquaintance to client
Confirm	0.079	0.041	4.188	1.243	2.365	Leverage ratio
Confirm	0.056	0.023	3.050	0.439	0.298	Corporation size
Confirm	0.062	0.036	4.905	2.012	1.565	Inventory ratio
Reject	0.027	0.046	4.105	1.612	0.370	Accounts receivable ratio

there must be numerous factors, whether related to auditors or clients, based on the CPAs' opinion which affect the audit quality. CPAs are facing a kind of paradox due to the budget time pressure and various risks, such as litigation risk, and creating balance between audit efficiency and audit quality (Wanda et al., 2002). One of the factors affecting auditor's role and opinion is the full-time and working CEO and board who are assumed to be responsible by the stockholders. Auditors who are selected by the stockholders should present their opinion based on professional morals and Iranian audit standards. However, in doing so, they are faced with several pressures such as extending the contracts duration by CEO or board members; and since there is no audit committee in Iranian companies, therefore the executive CEO and board play a major role in re-selection of the CPAs. Thus, considering the client, board, and CEO opinions is a certain priority of each auditor, which our hypothesis confirms in this research and their relationship is positive and direct. Another effective factor on auditors' opinion, which is also emphasized in theoretical principles, is the role and pressure from the major stockholder and family control that select the board. In Iran's corporate governance regulations, support for the minority's benefits is neglected, and the major or main stockholder is able to select the major managers and implement financial policies, financial support; and earnings sharing as well as other important decisions is based on his/her wishes using the terms stated in Iran's trade law. Also, the stockholder could select the auditor, which according to Iran's trade law must be selected by stockholders, and determine his/her wage. Therefore, it is predicted that this may affect the auditor's opinion. In this study, this positive effect is also confirmed and the auditor is affected by the main stockholder.

In addition to the two components of the corporate governance mentioned above, factors such as client's size, client's leverage, and disclosed inventory in financial statements are effective on the auditor's opinion. This has a direct relationship with the CPA's opinion. Usually, as companies' used financial facilities and their assets volume as well as inventory items diversity increase, the

risks and hazards also increase and the auditor's opinion would be presented with more sensitivity.

Investigating the type of CPAs' opinion in the studied companies showed that the executive board ratio, leverage, assets, and inventory are higher and larger in companies with qualified auditor's opinions. Of course, the relationship between leverage and auditor's opinion is invert.

Conclusion

Based on agency theory, it is expected that the CPAs act independently of the firm's management, particularly the executive board and the chairman, and fulfill their attestation task appropriately. In this research, the relationship between the executive board and full-time managers and CPAs' audit opinion is confirmed. An analysis of the structure and procedure within which CPAs are selected in Iranian companies reveals that the CPAs are chosen by the board of directors and the chairman. Thus, they have an important effect on accountants' audit opinions, and accountants cannot include auditing paragraphs in their reports prior to coordination with the board of directors and full-time managers. Furthermore, the texture of shareholders in firms can indirectly affect CPAs' audit opinions through the effect and power they can impose on selecting the board of directors and managers and the shareholders want the CPAs to arrange their accounting paragraphs according to their wills. For larger firms, such relationship is more significant and the reason for this can be that the capital market is more sensitive about such firms, and that those firms are more susceptible to evaluations by shareholders and government; therefore, firms' managers place more importance on accountants' opinions, and a slight amount of unqualified opinion of accountants can have an effect on managers' affairs and be followed by the reaction of the capital market. An examination of Iranian firms indicated that governmental organizations and institutes own the majority of the firms' shares, and minority shareholders have not received much of a support from regulations and other criteria; and

the main shareholder can decide on all the firms' policies, including financial, financing, and operational policies.

Suggestions

Based on the results of the research the followings are suggested:

1. Due to the auditor's position as the company's stockholder representative, the role of non-executive board members and audit committee as independent elements becomes more highlighted, and therefore the corporate governance regulations for Iranian companies must be modified.
2. Iran trade law must be reconsidered due to its oldness and lack of consistency with current conditions and because it does not take into account issues related to the governance system.
3. The auditor selection method must be reconsidered in Iran so that the auditor would have more independence and companies' executive members and CEO should not affect his/her opinions.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Organizational antecedents and perceptions of fairness in policy implementation among employees in the banking sector of Ghana

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Received 5 November, 2012; Accepted 11 September, 2014

This study examined the impact of fairness perceptions in policy implementations on employees' job satisfaction, work motivation and organisational commitment in the banking sector of Ghana. A correlational research design was adopted for the study. A total of 100 participants were randomly selected to respond to a 45-item questionnaire. Data obtained from the study were analysed with Pearson correlation, independent t-test and One-way ANOVA at 0.05 alpha levels. Findings reveal that job satisfaction and commitment were significantly related to employees' perceptions of fairness in policy implementation. Again, a statistically significant positive correlation was established between organisational commitment and job satisfaction. Also, it was found that a significant difference exists between age and employees work motivation. Moreover, the finding shows that there was a significant difference in organisational commitment based on employees' job position. Based on the findings, it was recommended that management in the banking sector should implement transparent and justifiable policy programmes that will boost employee satisfaction, motivation and commitment to working with the organisation. Policy implementers (or decision makers) in the banking business should pay particular attention to employee job satisfaction since the absence of satisfaction degenerate into lassitude and lessened organisational commitment.

Key words: Job satisfaction, work motivation, organizational commitment, fairness, policy implementation, banking sector, Ghana.

INTRODUCTION

The success or failure of every organisation depends on how well its employees perceive fairness in its policy implementation. Effective organisations, therefore, strive to make sure that there is always the spirit of trust, sense of commitment and appreciable level of satisfaction

among employees within its sphere of operations (Williamson and Williams, 2011). Perception of fairness deals with how people feel about the distribution of rewards, the process by which these rewards are allocated and how people are treated (Alam et al.,

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2010b). Its importance at the workplace cannot be overemphasized because it can affect the long term viability of any organisation in terms of the relationship between the employer and employees (Alam et al., 2010a). In addition, research has demonstrated that fair treatment has important effects on individual employee attitudes, such as satisfaction and commitment, and individual behaviours, such as absenteeism and citizenship behaviour (Colquitt et al., 2001). In agreement with this, it is conceivable that employees in the banking sector will compare their personal outcomes with those of their co-workers should there be any policy which affect them in one way or the other. Hence, not only is fairness perception a major concern to business owners and policy makers but also corporate (bank) managers as well as employees in both developed and developing economies.

According to Kovach et al. (2004), the only way to promote equity and diversity without incurring allegations of reverse discrimination is to implement a fair, transparent and defensible policy programme. Thus, the implementation of fair and transparent policies in the banking sector will make employees potentially satisfied and committed to their jobs. The current research seeks to investigate the relationship between organisational antecedents and perceptions of fairness in policy implementation among employees in the banking sector. Organisational antecedents in this context are defined as the related attributes of the job milieu such as employees' demographic characteristics, job satisfaction, work motivation and organisational commitment. A large number of studies have been done to investigate the determinants of job satisfaction (Oshagbemi, 2000; Donohue and Heywood, 2003; Al-Ajmi, 2006), work motivation (Gooderman et al., 2004; Nandanwar et al., 2010; Ayub and Raff, 2011) and organisational commitment (Meyer et al., 2003; Akinayo, 2010; Wang et al., 2011) in the field of management in relation to different professions. However, it is found that very few studies have been done on exploring the relationship between perceived fairness and some aspects of organisational antecedents (Khalifa and Truong, 2010; Ahmed et al., 2011; Williamson and Williams, 2011). Again, although several studies (Ofori et al., 2014; Okorley, 2013; Asiedu-Appiah et al., 2013; Sanda and Yeboah, 2011) have been done in the banking sector of Ghana, there is little hard evidence of research on how fairness perceptions impact employees' job satisfaction, work motivation and organisational commitment. Most especially, where the Ghanaian banking industry has particularly grown significantly in terms of numbers since the establishment of the first two banks, Barclays Bank (known as Colonial Bank) and Standard Chartered Bank (known as Bank of British West Africa) in 1917 and 1896 respectively. To date, there are about 30 licensed commercial banks, excluding rural banks, in Ghana (Bank of Ghana, 2013).

This proliferation of banks in Ghana is perceived to be attributable to the high profit returns banks earn in their operations. However, working in the banking sector has been an attraction and desire of most young graduates because of the perceived enticing conditions of service the banking sector offers compared to other sectors. On the other hand, as to whether bank employees in Ghana perceive policy implementations in their job to be fair and a contributor to their job satisfaction, work motivation and organisational commitment is yet to be studied.

Hence, the aim of this research is to determine employees' perceptions of fairness in policy implementations in the banking industry in relation to their job satisfaction, work motivation and organisational commitment. Again, the study explores whether there are significant differences in employees' perceptions of fairness and organisational antecedents with respect to the various demographic characteristics of employees in the banking sector of Ghana. This research work is intended to add to the extant justice perceptions literature. The findings of this research will certainly help the policy makers in the banking sector to implement fair, transparent and defensible policies and programmes that will in turn increase the satisfaction, motivation and commitment level of its employees.

EMPIRICAL REVIEW

Job satisfaction

In recent times, job satisfaction has become one of the most frequently studied constructs in the fields of industrial-organisational psychology, human resource management and organisational behaviour. Job satisfaction is perceived as an attitudinal variable measuring the degree to which employees like their jobs and the various aspects of their jobs (Spector, 1997; Stamps, as cited in Bull, 2005). In conjunction with this, Buitendach and de Witte (as cited in Bull, 2005) maintain that job satisfaction relates to an individual's perceptions and evaluations of a job, and this perception is in turn influenced by their circumstances, including needs, values and expectations. Individuals, therefore, evaluate their jobs on the basis of factors which they regard as being important to them (Sempene et al., 2002). The term job satisfaction was brought to the limelight by Hoppock (1935, p.47) who reviewed 32 studies on job satisfaction conducted prior to 1933 and observed that job satisfaction is "a combination of *psychological, physiological and environmental* circumstances that cause a person to say, 'I am satisfied with my job'". Such a description indicates the array of variables that influence job satisfaction but tell us nothing about its nature. However, Locke and Lathan (as cited in Tella et al., 2007, p.4) provide a comprehensive definition of job satisfaction as

“pleasurable or positive emotional state resulting from the appraisal of one’s job or job experience.” Thus, job satisfaction is a result of employee’s perception of how well their job provides those things that are viewed as important to them.

Work motivation

Just like the concepts of personality and attitude, motivation is a very significant ingredient in studying human behaviour. According to Buford et al. (1995), motivation is defined as the tendency to behave in an appropriate manner to attain certain needs. Relative to this definition, Creech (1995) postulates that motivation is typically defined by psychologists as a stimulation that causes the creation of aroused, sustained and directed behavior. This behaviour in turn leads individuals to work and perform towards organisational goal achievement. However, Luthan (cited in Tella et al., 2007) asserts that motivation should not be thought of as the only explanation of behaviour, since it interacts with and acts in conjunction with other mediating processes and with the environment. Like other cognitive processes, motivation cannot be seen (Luthan, 1998), yet managers can apply this organizational principle to encourage employees to work towards the achievement of a common goal. Spector (2003) asserts that a variety of factors motivate people at work, some of which are tangible (e.g. money) and some of which are intangible (e.g. sense of achievement). In line with this assertion, Finck et al. (1998) postulate that companies must recognize the human factor as an important ingredient for organisational success and survival, since business excellence can only be achieved when employees are excited and motivated by their work. Rutherford (cited in Manzoor, 2012) opines that motivation defines the success of an organisation because provoked employees are constantly looking for improved practices to do a work, so it is essential for organisations to increase the motivation of their employees. To this end, since employee performance is a joint function of ability and motivation, one of management’s primary tasks, therefore, is to motivate employees to perform to the best of their ability (Moorhead and Griffin, 1998; Mullins, 2010).

Organisational commitment

The extant literature on organisational commitment posits that the variable has a wide array of definitions and measures. However, the common theme running through these various definitions and measurement is that “organisational commitment is a bond or link of the individual to the organisation” (Mattieu and Zajac, cited in Ahmed et al., 2011, p.15). The concept of organisational

commitment is highly valuable and the importance of understanding its meaning is worthwhile. In this perspective, Mowday et al. (1974, p.226) contend that organisational commitment is “the relative strength of an individual’s identification with and involvement in a particular organisation. They conclude by saying that strongly committed employees are more likely to remain with the organisation than those with weak commitment.

The extant sociological literature also illustrates that two dominant concepts of organisational commitment exist in the form of employees (a) loyalty towards an organisation and (b) intention to stay with the organisation. To Northcraft and Neale (1996), commitment is an attitude reflecting an employee’s loyalty to the organisation, and an ongoing process through which organisational members express their concern for the organisation and its continual success and well-being. Thus, loyalty in this context can be viewed as an effective response to, and identification with, an organisation based on a sense of duty and responsibility which could predict employees decision to stay or leave the organisation. Determinants of organisational commitment include a number of factors such as (a) personal factors (e.g. age, tenure in the organisation, disposition), (b) organisational factors (job design and the leadership style of one’s supervisor) and (c) non-organisational factors (availability of alternatives). All these factors affect subsequent commitment (Northcraft and Neale, cited in Tella et al., 2007) of the individual within an organisation.

Based on the multifaceted nature of organisational commitment, (Akintayo, 2006; Dunham et al., 1994; Meyer and Allen, 1991, 1993) posit that the construct has three main components: affective, continuance and normative, each with its own underpinning implications for an employee’s participation in an organisation. According to the authors, *affective commitment* refers to an employee’s emotional attachment to, identification with, and involvement in, the organisation based on positive feelings or emotions toward the organisation. Meyer et al. (2003) opine that for the employee, the positives include enhanced feelings of devotion, belongingness, and stability. On the basis of this logic, one could argue that employees with low affective commitment will choose to leave an organisation, while employees with a high and positive affective commitment will stay for longer periods, as they believe in the organisation and its mission. *Continuance commitment*, on the other hand, is based on the high cost that an employee associates with leaving the organisation. Thus, in the words of Meyer et al. (2003), an employee whose primary link to the organisation is based on continuance commitment remains with the organisation because of the feeling that he/she needs to do so for material gains. Lastly, *normative commitment* has to do with an employee’s feeling of obligation to remain with an organisation based on the fact that he/she has internalized the values and goals of the organisation

and feels responsible and devoted to the organisation. Hence, an employee with a high level of normative commitment feels that he/she ought to remain with the organisation (Bentein et al., 2005; Jaros et al., 1993).

Job satisfaction, work motivation and organisational commitment

Job satisfaction cannot be talked of where there is the absence of motivation. According to Furnham (1992), it is often the case because the extent to which an individual is satisfied at work is dictated by the presence of factors and circumstances that motivates him or her. In line with this, Watson (1994) posits that businesses of today have realized that only a motivated and satisfied workforce can deliver powerfully to the end, even when the dike is raised. The relationship between job satisfaction and work motivation has been reported by several researchers (Megginson et al., 1982; Vinokur et al., 1994; Brown and Shepherd, 1997; Hoole and Vermeulen, 2003; Ayub and Rafif, 2011). Nevertheless, the relationship seems to be unequivocal and consistent among the several studies that have been conducted in the area. For instance, Ayub and Rafif's (2011) study of bank managers in Pakistan posit that a positive relationship between work motivation and job satisfaction exists. Ayub and Rafif concluded their study by saying that when managers basic and higher order needs are fulfilled at work, they will have positive attitude towards job and that will eventually lead to job satisfaction. In a similar vein, Hoole and Vermeulen (2003) found that the extent to which people are motivated by outward signs of position and status is positively related to their experience of job satisfaction. Another study by Megginson et al. (1982) revealed that people experience job satisfaction when they feel good about their jobs, and that this feeling often relates to they doing their jobs well, or they being recognized for their good performance. Additionally, Chess (as cited in Ayub and Rafif, 2011) reported that certain motivational factors contribute to the prediction of job satisfaction. Thus, the available literature supposes that a positive relationship exists between job satisfaction and employees' work motivation.

It is also important to note that an array of research investigation reports a significant positive relationship between job satisfaction and the dimensions of organisational commitment (Aranya et al., 1982; Buitendach and de Witte, 2005; Bull, 2005; Harrison and Hubbard, 1998; Johnston et al., 1990; Kreitner and Kinicki, 1992; Lu et al., 2002; Lu et al., 2007b; Morrison, 1997; Teng et al., 2007; Wang *et al.*, 2011). For example, Buitendach and de Witte (2005) examined the relationship between job satisfaction and organisational commitment based on their research among 178 maintenance workers in a parastatal in South Africa. Buitendach and de Witte concluded that they found evidence of a significant

relationship between job satisfaction and organisational commitment. In a similar vein, Kovach (1977) affirms that job satisfaction is a component of organisational commitment. Other researchers have also reported that job satisfaction is so important in that its absence often leads to lassitude and lessened organisational commitment of employees (Levinson and Hohenshil, 1987; Moser, 1997). Again, (Begley and Czajka, 1993; Chiu, 2000; Tharenou, 1993) posit that job satisfaction is correlated to enhanced job performance, positive work values, high levels of employee motivation, and lower rates of turnover and burnout. Lack of job satisfaction, then, is a predictor of quitting a job (Alexander et al., 1998; Jamal, 1997; Tella et al., 2007). Therefore, since work is an important aspect of peoples' life, an understanding of the factors involved in job satisfaction is necessary and relevant in improving the well-being of significant number of people.

Job satisfaction, work motivation, organisational commitment and employee demographic characteristics

Extant empirical evidence suggests that demographic variables such as age, gender and job position have influence on employee job satisfaction, work motivation and organisational commitment. In view of job satisfaction and gender, Oshagbemi's (2000) study reports that female academics at higher ranks precisely, senior lecturers, readers and professors, are more satisfied with their jobs than their male counterparts with comparable ranks. In addition, the findings of Jayaratne and Chess (as cited in Staudt, 1997) report a statistically significant difference between male and female social workers regarding job satisfaction in favour of the female counterparts. On the contrary, findings by Greenberg and Baron (1993) reveal that employed women, in general, seem to be less satisfied with their work than their counterparts, men. Nevertheless, other findings by researchers confirm that employees' gender have no significant effect on their perception of job satisfaction (Al-Ajmi, 2006; Donohue and Heywood, 2003; Rentner and Bissland, 1990). With regard to age, extant research suggests that older employees tend to experience higher levels of job satisfaction than their younger ones (Belcastro and Koeske, 1996; Billingsley and Cross, 1992; Bull, 2005; Cramer, 1993; Johnson and Johnson, 2000; Loscocco, 1990). For instance, Blood et al. (2002) in their study confirm that older respondents are more likely to report higher levels of job satisfaction than their younger respondents. Blood et al. further argue that job satisfaction increases with age and work experience. This perhaps may account for the *raison d'être* why older workers are more comfortable and tolerant than their younger workers. Also, a similar study by Siu et al. (2001) with a sample of managers also reported that age was positively related to job satisfaction and mental well-

being. Additionally, job position is seen as having influence on employee job satisfaction. In investigating the influence of organisational position on attitude, job satisfaction and performance level of employees, Butler and Ehrlich (cited in Bull, 2005) found that position largely determines the job demands and characteristics of the work environment experienced by workers. Similarly, Gazioglu and Tanzel (2002) found that managers, professionals and clerical employees were more satisfied with their jobs. However, Gazioglu and Tanzel proffer the view that clerical grade staffs were less satisfied as compared to sales employees with respect to (a) the sense of achievement, (b) respect from supervisors and (c) amount of pay. Again, research shows that there is a positive correlation between rank and job satisfaction (Robie et al., 1998; Vorster, as cited in Bull, 2005). However, this relationship may be attributed to the fact that higher-level jobs tend to be more complex and have better working conditions, pay, promotion opportunities, autonomy and responsibility.

Similarly, some studies have been conducted on the relationship between work motivation and demographic characteristics. For instance, Reif et al. (1976) examined the significance of 33 particular rewards for men and women and reported that gender was the determining factor of appreciation of the value of reward. Again, Hofstede (2001) proffers the view that while men's concerns are mostly earnings, promotion and responsibility, women value friendly atmosphere and usually concern with prestige, challenge, task significance, job security, co-operation and work environment conditions. Similarly, Ayub and Rafif (2011) examined the relationship between work motivation and job satisfaction among bank managers in Pakistan and found that male managers were highly motivated than their female counterparts with respect to their roles. However, Pearson and Chatterjee's (2002) study in China found that despite divergences, gender uniformity in job motivation of men and women dominated. Pearson and Chatterjee concluded that respondents' shared the same attitudes with regard to high earnings, work autonomy, training opportunities and relations with managers. Furthermore, in examining the intervening factors affecting the relationship between incentives and employee motivation in India, Nandanwar et al. (2010) reported that age was a significant positive predictor of employees' work motivation in the pharmaceutical industries. Furnham et al. (n.d) also in their study titled "Personality, motivation and job satisfaction: Herzberg meets the Big Five" found that among the three factor scores (*conditions and security; status and rewards; personal development and stimulations*) of the Work Values Questionnaire (WVQ), age was a significant positive predictor of conditions and security factor. However, Furnham et al. further opined that age was not a significant predictor of *status and rewards* and *personal*

development and security factor scores. Their findings corroborate Oloruntoba and Ajayi (2003)'s finding that there is no significant relationship between socio-economic characteristics (e.g., age) of respondents and motivational factors. In the terms of the relationship between work motivation and job position, Oloruntoba and Ajayi (2003) in their study titled "Motivational factors and employees' job satisfaction in large-scale private farms in Ogun State, Nigeria" concluded that employees' motivation was not influenced by their respective designation. Oloruntoba and Ajayi (2003)'s finding was later confirmed by Nandanwar et al. (2010) in the work "Intervening factors affecting the relationship between incentives and employee motivation: A case study of pharmaceutical manufacturing organisation in Navi Mumbai". However, Furnham et al. (n.d) in their investigation of the impact of individual differences upon motivation/work values found that job status was a significant positive predictor of the results for *security and conditions* factor, and a significant negative predictor of employees' *reward and status* factor.

Demographic characteristics such as gender, age and job position have over the years been investigated by researchers per their influence in the prediction of employee organisational commitment. For example, whereas the general contention appears to be that women as a group tend to be more committed to their employing organisations (Cramer, 1993; Harrison and Hubbard, 1998; Loscocco, 1990; Mathieu and Zajac, 1990; Mowday et al., 1982; Reyes, 2001); studies by some African scholars (Adekola, 2006; Akintayo, 2006, 2010; Ajaja, 2004) reveal that men are more committed to their work than their female counterparts. Contrary to this contention, several researchers have found that no relationship exists between gender and organisational commitment (Al-Ajmi, 2006; Billingsley and Cross, 1992; Caruana and Calleya, 1998; Kinnear and Sutherland, 2000; Ngo and Tsang, 1998; Wahn, 1998). Also, research on the relationship between organisational commitment and age is indisputable and consistent across several fields of study. Dunham et al. (cited in Bull, 2005) indicate that a significant relationship exists between organisational commitment and age. However, some theoretical arguments on what may account for the relationship between organisational commitment and age exist in the literature. Theorists like Kacmar et al. (1999), Mathieu and Zajac (1990) and Mowday et al. (1982) argue that limited employment opportunities as a result of aging makes current jobs more attractive to older employees. Other proponents (Harrison and Hubbard, 1998; Kacmar et al., 1999) theorize that older employees exhibit greater commitment level to their organisations because they have a greater investment (e.g. time and energy) and history with the organisation than do younger employees. Based on this logic, one can argue that the older an employee, the less mobile and the more

committed they are to their employed organisations. Unlike age and gender, not much study has been conducted to establish a relationship between organisational commitment and job position. Nevertheless, Wang et al.'s (2011) study on Job satisfaction, occupational commitment and intent to stay among Chinese nurses found that job position was significantly and positively related to occupational commitment. Wang et al. (2011) conclude that "job position in most cases corresponds with increasing age...the older nurses most probably have higher positions, wages and benefits, and greater achievements, contributing to higher levels of organisational commitment" (p.8). Similarly, a meta-analysis of twenty seven studies by Randall and O'Driscoll (1997) demonstrate that personal characteristics like age, gender, tenure and *position* were highly significant in determining organisational commitment. It may, thus, be concluded that a growing body of evidence appears to support a significant relationship between job position and organisational commitment with those in higher positions being more committed compared to the lower position employees.

Perceptions of fairness

The concept of justice or fairness which permeates many actions and reactions in organisations today has received much attention by researchers (Nowakowski and Conlon, 2005). Like Nowakowski and Conlon, Colquitt et al. (as cited in Esterhuizen and Martins, 2008) opine that the perception of fairness and specifically the relationship between fairness and various organisational antecedents (for example job satisfaction, turnover and organisational commitment) have been directly linked in recent research. However, one cannot talk of fairness, without the mention of Equity theory (Adams, 1965) which suggests that individuals will make comparisons between themselves and others with regard to their rewards resulting in fairness perceptions which may affect their motivation, morale and work related behaviour (*Furnham*, as cited in Williamson and Williams, 2011). Thus, any policy implementation leading to an organisational change can be perceived as ominous by those affected and careful consideration is needed to guard and guide against feelings of inequity (that is, suspicion and loss of security).

According to Colquitt et al. (2001), justice or fairness in the workplace can be defined as the focus on the antecedents and consequences of two types of subjective perceptions, namely the fairness of outcome distribution and allocation and the fairness of the procedures used to determine outcome distribution and allocation. However, Williamson and Williams (2011) emphasize that organisational justice theory (OJT), which combines social psychological theories and psychological contract

paradigms to explain fairness judgments, provides a model through which perceptions of fairness and equity by those affected by change resulting from policy implementations can be explored and understood. It is, then, conceivable that when a policy implication is seen as unfavourable within the organisation, employees will usually experience perceptions of inequity (or fairness violation). Hence, based on an individual's perception of fairness within a particular organisation, three forms of organisational justice can be deduced, *videlicet* distributive, procedural and interactional justice or fairness.

Distributive justice primarily is the first of the fairness constructs to have been studied. According to Adams (1965) distributive justice occurs when an individual determines fairness by evaluating his/her perceived inputs relative to the outcome received. Opatow (as cited in Esterhuizen and Martins, 2008) asserts that distributive justice focuses on whether societal resources such as jobs, promotions and educational opportunities are distributed fairly. Opatow (1997) further postulates that in general, political and economic policies lead to specific distributive outcome. Though available literature demonstrates that distributive justice have a significant correlation with pay satisfaction (Roch and Shanock, 2006) and intention to reduce effort (Stecher and Rosse, 2005), Forret and Love (as cited in Williamson and Williams, 2011) suggest that distributive justice has a direct impact on co-worker relationships which results in a lack of trust, poor morale and low productivity. Thus, it is worth noting from the foregoing discussion that any adverse impact on co-worker relationship in the banking institution, be they lack of trust and poor morale, would have significant implications for customer care and service delivery.

Available literature suggests that the original work of procedural justice was done in the context and framework of legal procedure. Nowakowski and Conlon (2005) define procedural justice as the fairness of the process that is used to arrive at decisions. According to Esterhuizen and Martins (2008), the development of the concept of procedural justice was made possible by (Thibaut and Walker, 1975) work on procedural justice from the psychological perspective. However, studies have shown that procedural justice has a direct bearing on organisational commitment and extra-role behavior [ERB] (Fischer and Smith, as cited in Williamson and Williams, 2011) where ERB is seen as a behaviour which benefits or is intended to benefit the organisation and goes beyond existing role expectations (Van Dyne and LePine, 1998). Thus, given the enormous benefits of ERB, it behooves management in the banking sector to reduce the level of employees' perception with respect to what constitutes the outcomes of procedural justice in order to encourage extra-role behaviour.

Interactional justice focuses on decision makers in that

in the same organisation a fair procedure could create very different reactions among employees, depending on how different managers (or decision makers) implement and enforce that procedure (Bies and Moag, 1986). Greenberg (as *cited* in Esterhuizen and Martins, 2008) asserts that interactional justice can be divided into two forms, viz *interpersonal* and *informational* justice. Whereas interpersonal justice refers to the sensitivity, politeness and respect people receive from their superiors during procedures, that of informational justice is seen as the explanation or justification provided by decision makers as to why outcomes were distributed in a certain way. All in all, interactional justice can be seen as the respect, dignity and sensitivity shown to employees when outcomes are allocated as well as the justification underpinning the allocation of outcomes. Niehoff and Moorman (1993) assert that interactional justice, in the form of *interpersonal* and *informational*, has an effect on co-worker relationships and organisational citizenship. On the other hand, Crawshaw (as *cited* in Williamson and Williams, 2011, p.62) suggests that “the agents of change within an organisation could be linked with fairness perceptions and that adequate information and feedback in relation to decisions made must be provided in order to promote honesty, transparency, consistency, bias suppression and equity” in the organisations where they work.

The consequence of perceived unfairness could be seen in an individual's behavioural response to the magnitude of perceived inequity. Mullins (2010, p.275) proffer the view that based on exchange theory of organisational and social behaviour, “equity theory focuses on people's feelings of how fairly they have been treated in comparison with the treatment received by others.” However, inequity occurs when the ratio of a person's outcomes (e.g. salary, promotion, job security, recognition) to inputs (e.g. level of education, performance, past experience) are not equal as compared to that of others (Adams, 1965; Henle, 2005; Hellriegel et al., 1989). A study by Stecher and Rosse (as *cited* in Williamson and Williams, 2011) demonstrates a significant correlation between distributive justice, negative emotions and withdrawal behaviour-most notably intention to leave and intent to reduce workplace effort. Like (Nowakowski and Conlon, 2005; Colquitt et al., 2001), Roch and Shanock (2006) maintain that many important organisational attitudes and behaviours can be directly linked to employees' perceptions of fairness. For instance, research has shown that the contravention of distributive, procedural and interactional, be it interpersonal or informational justice lower employees' job satisfaction, organisational commitment and trust in decision makers (Coetzee, 2005; Colquitt et al., 2001). Again, Colquitt et al. (2001) theorize that a negative relationship exists between performance and perceived procedural injustice. It is worth noting that the behavioural outcome emanating

from perceived inequity by employees in the banking sector could have an adverse consequence on service delivery and client relations if care is not taken to mitigate this dilemma called injustice.

Perceived fairness and employee demographic characteristics

Even though no conclusive evidence has been reached with regard to the level of perception among men and women, it appears that gender differences in organisational justice have received some attention from researchers in diverse professions. Results from several studies depict that no significant difference exists in fairness perceptions based on gender (Coetzee, 2005; Esterhuizen, 2008; Esterhuizen and Martins, 2008). For instance, Al-Zu'bi (2010) examined the relationship between organisational justice and job satisfaction among employees of electrical industrial companies in Jordan. Al-Zu'bi's study found that amongst the personal traits of respondents, there was no significant relationship between gender and perceptions of organisational justice. This finding corroborates the findings of Alsalem and Alhaiani (2007) study on the relationship between organisational justice and employee performance. However, other studies have also reported significant differences between males and females (SIOP Committee, 1995; Van and Roodt, 2003; Duweke, 2005).

The existing literature on the relationship between age and employees perceptions of fairness is inconsistent. For instance, the results of Al-Zu'bi's (2010) study on employees in electrical industrial companies in Jordan reports a statistically significant relationship between respondents' age and their perceptions of organisational justice. In conjunction with this, Alsalem and Alhaiani (2007) examined the relationship between organisational justice and employee performance and concluded that a statistically significant relationship exists between respondents' age and perceptions of organisational justice. Similarly, other studies (Walbrugh and Roodt, 2003; Duweke, 2004; Coetzee, 2005) have also shown significant differences based on respondents' age. However, studies in South Africa by SIOP Committee (1995) and Esterhuizen (2008) reveal that no statistically significant differences in perceptions of fairness base on age group exist. Thus, the result from Esterhuizen study on organisational justice and employee response to employment equity concludes that employees of all ages had more or less the same perceptions whether positive or negative.

There is not enough literature on the relationship between organisational justice and employees' job position. However, the available literature supports the notion that significant differences exist and that employees whose jobs involve the implementation of Employment Equity

(EE) practices are more positive about these practices (Coetzee, 2005; SIOP Committee, 1995) than their counterparts at the lower levels. Similar to this notion, Esterhuizen (2008) study on organisational justice and employee response to employment equity sought to establish whether there were significant differences between the respective job levels of employees and their perception of employment equity. The results of Esterhuizen's study revealed that there were significant differences between the perceptions of managers and non-managers, and that managers were generally more positive and satisfied with EE practices than employees on staff level.

Relationship amongst perceptions of fairness, job satisfaction, work motivation and organizational commitment

The relationship between perceptions of fairness and job satisfaction has been investigated by several researchers (McIntyre et al., 2002; Rifai, 2005; Paik et al., 2007; Lambert et al., 2007; Deconinck and Bachmann, 2007; Khalifa and Truong, 2010). For instance, the findings of Rifai's (2005) study on the factors that influence organizational citizenship behaviours reveal that significant positive relationships exist between procedural justice and distributive justice as independent variables and job satisfaction as dependent variable. In a similar study by Deconinck and Bachmann (2007) using marketing managers as their respondents, the researchers reported that perception of pay fairness had a positive relationship with organisational outcomes such as job satisfaction. Deconinck and Bachmann (2007) concluded that marketing managers who perceived that rewards were allocated equitably reported higher levels of job satisfaction which in turn positively affected their organisational commitment and negatively affected their intention to leave. Khalifa and Truong (2010) examined a causal hypothesis relating the perceptions of equity among academic employees of Egyptian private universities to job satisfaction when the outcome in the comparison is one of Herzberg's motivators (recognition, advancement and growth). Khalifa and Truong (2010) reported that the 85 participants' perceptions of fairness had positive relationships with their job satisfaction with perception of recognition fairness being the most important predictor of job satisfaction.

Even though the relationship between justice perception and employees' motivation has been conceptualised in the available literature (Adams, 1963, 1965; Porter and Lawler, 1968; Katzell and Thompson, 1990; Locke and Latham, 2004), human resource investigations are yet to provide empirical evidence. For instance, the relationship, according to equity theory (Adams, 1963, 1965) can be described as: unfair outcomes (e.g. pay, status, promotion) give employees a motivational force to rectify the

unfair situation if they are not happy with these outcomes, and one behavioural action that could be taken is to reduce their inputs or performance level (Hellriegel et al., 1989; Cropanzano and Rupp, 2003; Fassina et al., 2008; Mullins, 2010). However, the only few studies that have been conducted in this area of research have indicated the importance of justice as a predictor of employees' motivation (Dubinsky and Levy, 1989; Tyagi, 1990; Smith et al., 2000). For example, Tyagi's (1990 cited in Liao et al., n.d) study of insurance sales persons found that their perception of *money inequity* had a significant adverse effect on extrinsic motivation, and *recognition inequity* had the strongest negative effect on intrinsic motivation of insurance salespersons. Also, Dubinsky and Levy (1989 cited in Liao et al., n.d) also found fairness perception of pay administration to be positively related to retail salesperson's motivation. Hence, although researchers have suggested that justice perception is related to employees' work motivation, the direction of the relationship is disputable and conflicting in the available literature.

A survey conducted by Lowe and Vodanovich (1995) and Sweeney and McFarlin, (1992) revealed that distributive justice was a stronger and better predictor of organisational commitment compared to procedural justice. Contrary to this, Ahmed *et al.*, (2011) argue that the procedures of a firm regarding fairness may have a greater impact on organisational commitment than the fairness of distributive outcomes that workers receive, possibly because procedures define the organisation's capacity to treat employees fairly. Again, Ahmed *et al.* (2011) posit that another possible reason that may account for distributive justice as a better predictor of attitudinal outcomes of employees might be that employees are not exactly aware of the procedures used by the organisation and therefore may rely only on outcomes. According to Cropanzano and Folger (1989, 1991), there is a negative relationship between employees' perception of unfair treatment and their commitment to the organisation. This implies that the higher employees perceive that they are being treated fairly the greater will be their commitment level to the organisation. In the same vein, Malatasta *et al.*, (cited in Ahmed *et al.*, 2011, p.16) state that "organisations can increase the level of commitment for their employees by providing them equitable and fair rewards." Hence, from the preceding discussions, it is worth concluding that a positive correlation exists between perception of fairness and organisational commitment.

Hypotheses

Based on the above literature reviewed, the following hypotheses are formulated to guide the research work.

H_1 : Perceived fairness in policy implementation is

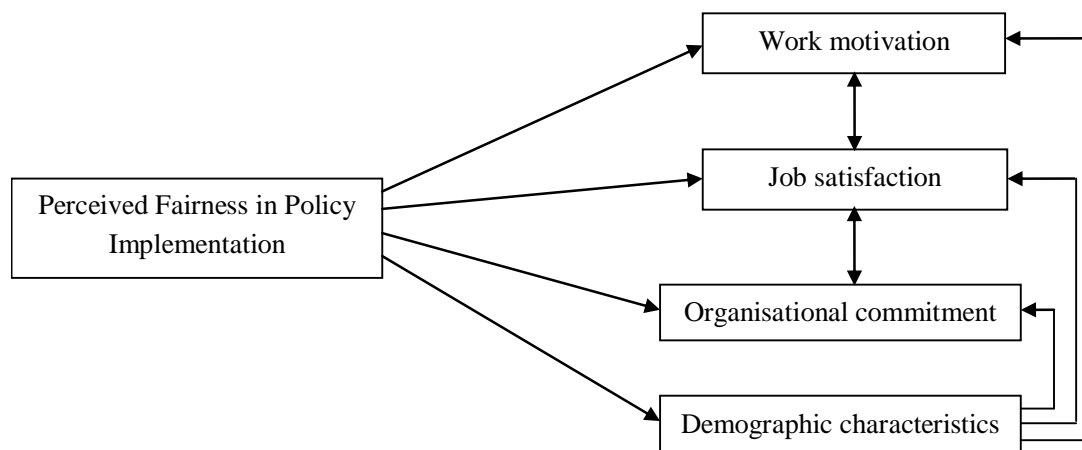


Figure 1. The model of employees' perception of fairness in policy implementation. Source: Author (2014).

positively related to job satisfaction.

H_2 : Perceived fairness in policy implementation is positively related to motivation.

H_3 : Perceived fairness in policy implementation is positively related to organisational commitment.

H_4 : Job satisfaction is positively related to motivation and organisational commitment.

H_{5a} : Males will differ from females in their perceptions of fairness.

H_{5b} : Females will be more satisfied with their jobs than males.

H_{6a} : Scores of job satisfaction differ across employees' age group.

H_{6b} : Scores of work motivation differ across employees' age group.

H_{6c} : Scores of organisational commitment differ across employees' age group.

H_{7a} : Employees job satisfaction differs with their job position.

H_{7b} : Employees motivation to work differs with their job position.

H_{7c} : Employees commitment differs with their job position.

Research model

The research model is seen in Figure 1.

METHOD

Participants, sample and procedure

Participants were randomly selected from four registered commercial banks namely *Merchant Bank now Universal Merchant Bank*, *The Trust Bank (TTB) now part of Ecobank*, *Home Finance Company (HFC) and United Bank of Africa (UBA)* in the capital city of Ghana. The sample used in this study consisted of 100 employees from the four listed commercial banks in the capital city.

Questionnaire as an instrument was used for the data collection. Questionnaires with an introductory letter assuring participants of their confidentiality and anonymity were randomly administered to 100 employees in the bank; out of which 94 completed questionnaires were returned by the employees yielding a response rate of 94.0%. Of the 94 completed questionnaires by respondents, four were incomplete and therefore were excluded from the analysis. So, the effective response rate of completely filled questionnaires was 90.0%.

Respondents' demographic characteristics are presented as follows: With regard to gender of respondents, the majority ($n=52$, 57.8%) were males as compared to their female counterparts ($n=38$, 42.2%). For job position, the majority ($n=37$, 41.1%) were supervisors, followed by clerks ($n=27$, 30.0%) and then managers ($n=26$, 28.9%). However, majority of the respondents were predominantly between 20 and 30 years old ($n=50$, 55.6%). In addition, 26 (28.9%) were between 41 and 50 years old and the remaining age category, 51-60 years and over 60 years, were the same ($n=7$, 7.8%).

Measures

Apart from demographic data on respondents (gender, age and job position), 37 items comprising five points Likert scale ranging from strongly disagree (1) to strongly agree (5) constituted the questionnaire for data collection. All questionnaire items were self-developed and self-administered by the researchers. To ascertain the normality of the data collected, one-sample Kolmogorov-Smirnov test was performed. The test was conducted on the basis that if the p-value is greater than 0.05 then the data is normal. On the other hand if it is below 0.05 then the data significantly deviate from a normal distribution. It was concluded from the test that scores for perceptions of fairness ($p=0.79$), job satisfaction ($p=0.46$), work motivation ($p=0.06$) and organisational commitment ($p=0.08$) were normally distributed with a p-value greater than 0.05 significance level.

Items measuring employees' perceptions of fairness in policy implementations were developed after reviewing current studies by different researchers (Al-Zu'bi, 2010; Khalifa and Truong, 2010; Ahmed *et al.*, 2011; Najafi *et al.*, 2011; Williamson and Williams, 2011). In all, 15 items were constructed to measure employees' perceptions of justice in policy implementation in the banking sector. Again, after reviewing literature on the constructs job

Table 1. The resulting Cronbach's alpha internal consistency reliability coefficients for the variables.

Variables	No. of items	Alpha values (α)
Perceived fairness in policy implementation	15	0.90
Job satisfaction	9	0.92
Work motivation	4	0.78
Organisational commitment	9	0.83

Table 2. Means, standard deviations and correlations among perceptions of fairness, job satisfaction, work motivation and organisational commitment.

Variables	Mean	SD	1	2	3	4
Perception of fairness	41.00	9.80	1			
Job satisfaction	50.80	14.00	0.554**	1		
Work motivation	10.60	2.60	0.143	0.204	1	
Organisational commitment	23.30	6.60	0.368**	0.250*	0.064	1

Notes: $N=90$; Correlation is significant at ** $p < 0.01$, * $p < 0.05$ all two-tailed tests.

satisfaction and *organisational commitment*, 9 items each were developed by the researchers for the study. Lastly, 4 items were developed to measure employees *work motivation* in the banking sector. The resulting Cronbach's alpha internal consistency reliability coefficients for the variables are presented in Table 1.

Data analysis

Descriptive statistics, including mean and standard deviation together with Pearson's product moment correlation were used to investigate relationships between perceptions of fairness in policy implementation, job satisfaction, work motivation and organisational commitment. Independent samples t-test was used to examine gender difference of participants in terms of variations for perceptions of fairness and job satisfaction. Again, independent samples t-test was used to analyze variations in job satisfaction, work motivation and organisational commitment across participants' job position and age category. Analysis of data in this study was done using IBM SPSS Statistics, version 19.0 with a significant level set at $P=0.05$.

RESULTS

Using descriptive statistics (mean and standard deviation) and Pearson's correlation, it was identified that correlations exist between perceptions of fairness, job satisfaction and organisational commitment. Again, a weak but significant positive relationship was established between two of the organisational antecedent variables as shown in Table 1. Perceptions of fairness was found to be significantly related to job satisfaction ($r=0.554$, $p<0.01$) and organisational commitment ($r=0.368$, $p<0.01$). Organisational commitment was significantly associated job satisfaction ($r=0.250$, $p<0.05$). However, work motivation had no important correlation with employees'

Table 3. Differences in perceptions of fairness and job satisfaction based on gender.

Gender	Perceptions of fairness	Job satisfaction
Male		
<i>N</i>	52	52
Mean	40.40	49.92
Standard Deviation	9.89	13.60
Female		
<i>N</i>	38	38
Mean	41.74	51.92
Standard deviation	9.79	14.62
t-statistics	-0.63†	-0.66†

† $p < 0.05$ (Not significant); $N=90$.

job satisfaction, organisational commitment and perceptions of fairness. The results as shown in Table 2, thus, provide initial confirmation for $H1$, $H3$ and $H4$.

To determine whether differences exist in employees perceptions of fairness and job satisfaction based on their gender, an independent samples t-test was conducted. Using independent samples t-test there was no significant difference between males ($M= 40.40$, $SD = 9.89$) and females ($M= 41.74$, $SD= 9.79$) perceptions of fairness ($t= -0.63$, $p > 0.05$). In a similar vein, no significant difference was recorded in job satisfaction ($t= -0.66$, $p > 0.05$) for males ($M= 49.92$, $SD= 13.60$) and females ($M= 51.92$, $SD= 14.62$) as shown in Table 3. The results as shown in Table 3 indicate that no gender

Table 4. Differences in organizational antecedents across age category of employees.

Variable	20-30 years (A)	41-50 years (B)	51-60 years (C)	< 60 years (D)
Job satisfaction				
<i>N</i>	50	26	7	7
Mean	50.16	54.35	42.29	50.29
F-statistics		1.48†		
Work motivation				
<i>N</i>	50	26	7	7
Mean	11.46	9.62	10.57	8.29
Mean Difference(A-D)		3.17**		
F-statistic		5.79**		
Organ. commitment				
<i>N</i>	50	26	7	7
Mean	22.72	25.57	20.14	22.28
F-statistic		1.80†		

** $p < 0.05$ (Significant); † $p > 0.05$ (Not significant); $N=90$.

Table 5. Differences in organizational antecedents across job position of employees.

Dependent Variables	Manager (A)	Supervisor (B)	Clerk (C)
Job satisfaction			
<i>N</i>	26	37	27
Mean	48.62	52.81	50.04
F-statistics	0.73†		
Work motivation			
<i>N</i>	26	37	27
Mean	10.42	10.57	10.85
F-statistic	0.19†		
Organ. commitment			
<i>N</i>	26	37	27
Mean	22.42	25.35	21.37
Mean Difference (C-B)	-3.98**		
F-statistic	3.35**		

** $p < 0.05$ (Significant); † $p > 0.05$ (Not significant); $N=90$.

difference exists in employees' perceptions of fairness and job satisfaction.

To investigate the differences in job satisfaction, work motivation and organisational commitment across employees' age category, one-way analysis of variance (ANOVA) was employed. The results in Table 4 illustrate that significant difference exists in work motivation across employees age categories [$F(3, 86) = 5.79, p < 0.05$]. Thus, employees within 20-30 years of age ($M = 11.46$)

felt significantly fairly motivated than their counterparts above 60 years ($M = 8.29$). However, no significant differences in the scores on job satisfaction [$F(3, 86) = 1.48, p > 0.05$] and organisational commitment [$F(3, 86) = 1.80, p > 0.05$] across the age groups of participants were recorded. The statistically significant difference in work motivation recorded in Table 4 confirms *H6b*.

One way ANOVA (Table 5) shows that scores regarding organisational commitment are statistically different

[$F(2, 88) = 3.35, p < 0.05$] across the designation groups of employees. Thus, clerks ($M=21.37$) felt significantly less committed to their organisation than supervisors ($M=25.35$) as evident by the significant t-statistic of their mean difference at 5% alpha level. Nevertheless, no statistically significant difference was recorded in employees' job satisfaction with regard to their designation [$F(2, 88) = 0.73, p > 0.05$]. Similarly, employees' work motivation was not significantly different across their job position [$F(2, 88) = 0.19, p > 0.05$]. The statistically significant difference in employees' organisational commitment using their job positions provides preliminary support for *H7c*.

DISCUSSION

The findings of this study reveal that a significant positive relationship exists between perceived fairness in policy implementation, job satisfaction and organisational commitment, although correlation between perceptions of fairness and commitment was moderate. However, no correlation was observed between fairness perceptions and work motivation. Besides, the study findings also show that a significant relationship exists between organisational commitment and job satisfaction.

The correlation that exists in this study between fairness perception and job satisfaction corresponds with (Rifai, 2005; Paik et al., 2007; Deconinck and Bachmann, 2007) who reported that significant positive relationships exist between procedural and distributive justices as independent variables and job satisfaction as a dependent variable. The result also corroborates Khalifa and Truong (2010)'s findings that perceptions of equity among academic employees of Egyptian private universities were positively related to their job satisfaction, with perception of recognition fairness being the best predictor of job satisfaction. Given the positive correlation between perceived fairness and job satisfaction, it is worth concluding with Coetzee (2005) and Colquitt et al. (2001)'s assertion that any contravention in policy implementation may lower employees' job satisfaction and trust in decision makers. Similarly, the positive correlation between perceptions of fairness and organisational commitment as reported in this study agrees with Ahmed et al. (2011)'s findings that perceived fairness in performance appraisal positively relates with organisational commitment, even though, distributive justice may be a better predictor of employees' attitudinal outcomes like commitment. This is further supported by Cropanzano and Folger (1989), who reported that a negative relationship exists between employees' perception of *unfair* treatment and their commitment to an organisation. They concluded that the higher employees' perceive fair treatment, the greater their commitment to their organisations. However, though justice perception

has been empirically reported as a predictor of employees' work motivation (Dubinsky and Levy, 1989; Tyagi, 1990; Smith et al., 2000), the current study found no relationship between perceptions of fairness and employees' work motivation. This finding can be as a result of the prestige and importance Ghanaians associate with working in the banking industry; thus employees get on with the job whether they perceived fairness or not. Furthermore, it could also be that employees are grateful for the opportunity to have a job in view of the high unemployment situation in Ghana and therefore are less mindful of issues of inequity in the work situation in this instance. Interestingly, this finding contradicts the theoretical propositions advanced by theorists like Adams (1963, 1965), Porter and Lawler (1968), Katzell and Thompson (1990) and Locke and Latham (2004) who conceptualised a correlation between fairness perception and employees' work motivation, but never indicated the direction of the relationship.

Again, the results obtained in this study show that no gender differences were observed in employees' perception of fairness in policy implementation. The findings of researchers (Coetzee, 2005; Esterhuizen, 2008; Esterhuizen and Martins, 2008) that no significant gender differences exist in justice perception corroborate this result. Similarly, ideas of no gender differences in perceptions of fairness in studies by Al-Zu'bi (2010), Alsalem and Alhaiyani (2007) confirm the present results. However, the present finding is in discord with studies by SIOF Commitment (1995), Van and Roodt (2003) and Duweke (2005) which report a significant gender differences in fairness perception. Additionally, this study indicates that gender does not play any role in respondents' job satisfaction. This finding confirms Al-Ajmi (2006), Donohue and Heywood (2003) and Rentner and Bissland (1990)'s assertion that employees' gender has no significant effect on their perception of job satisfaction. Nevertheless, this finding is not supportive of Oshagbemi (2000)'s report that female academics at higher ranks are more satisfied with their jobs than their male counterparts with comparable ranks. Again, the results of this study contradict previous findings by Greenberg and Baron (1993) who opine that employed women, in general, seem to be less satisfied with their work than their male counterparts.

Furthermore, results in this study reveal differences in employees' work motivation based on age exist. This result confirms Nandanwar et al. (2010)'s findings that age is a significant positive predictor of employees' work motivation in the pharmaceutical industries. The result, however, challenges the findings of Olorunfoba and Ajayi (2003) that no significant relationship exists between socio-economic characteristics (e.g. age) of respondents and motivational factors. However, no significant differences were recorded in employees' job satisfaction and organisational commitment across their age

categories. The fact that no age differences were observed in employees' *job satisfaction* and *commitment* contradict some previous findings. For instance, Blood *et al.* (2002) suggest that job satisfaction increases with age and work experience. Thus, older employees are more likely to report higher levels of satisfaction than younger ones. Similarly, Siu *et al.* (2001) and Rhodes (as cited in Bull, 2005) conclude that age is positively related to job satisfaction. Also, Dunham *et al.* (as cited in Bull, 2005) posit that a significant relationship exists between organisational commitment and age. This relationship is argued in favour of older employees due to (a) limited employment opportunities as a result of ageing (Kacmar *et al.*, 1999; Mowday *et al.*, 1982) and (b) greater investment in terms of time and energy, and identification with the organization (Harrison and Hubbard, 1998). On the contrary, the finding of Reudavey (2001) that age and job satisfaction are not related, validates this present result.

Finally, the study as well found a significant difference in commitment based on employees' job position. The findings of Wang *et al.* (2011) among Chinese nurses revealed that job position was significantly and positively related to occupational commitment. Similarly, a meta-analysis by Randall and O'Driscoll (1997) demonstrates that personal characteristics like position are highly significant in determining organisational commitment. Besides the results of Wang *et al.* (2011) and Randall and O'Driscoll (1997), the present finding also corroborates the findings of previous researchers (Laurel and Goulet, 2002; Lu *et al.*, 2002; Lou *et al.*, 2007) as evident in the literature. However, unlike the findings of Gaziouglu and Tanzal (2002) and Burke (1996), this study found no significant difference in job satisfaction based on positions held by employees in the banking industry. Again, the fact that no difference occurred in employees work motivation across their job position confirms the findings of Oloruntoba and Ajayi (2003) and Nandanwar *et al.* (2010) that designation has no significant impact on employees' motivation. All the same, this finding contradicts the view of Furnham *et al.* (n.d) that job status is a significant positive predictor of job security and conditions, and negative predictor of employees' reward and status.

CONCLUSION AND PRACTICAL IMPLICATIONS

The distribution of rewards has over the decades been an issue that organizations have had to deal with especially where employees' perception of fairness about their rewards informs their level of commitment towards the success of organisations. Employees tend to develop a sense of inequity when they find out that relatively, the rewards they receive are not equal to that of their colleague workers particularly in the same firm or industry

where they almost undertook same or similar tasks. Thus, the possible consequential effect of inequity could be employees' unwillingness to contribute effectively and positively to an organization's success. Kovach *et al.* (2004) aver that the only way to promote equity and diversity without incurring allegations of reverse discrimination is to implement fair, transparent and defensible policy programmes. This becomes more feasible since job satisfaction, motivation and organisational commitment are considered as important variables that could be influenced by the sense of justice and fairness employees have towards an organisation (Deconinck and Bachmann, 2007; Tyagi, 1990; Cropanzano and Folger, 1989, 1991). It was in view of this that this study was conducted to find out if fairness perception influences employees' job satisfaction, work motivation and organisational commitment in the context of Ghanaian banks.

The study findings indicated that the views employees have regarding reward distribution would not only influence the satisfaction they have for the jobs they do but also the desire to be loyal to their organisations. In this regard, it is worth concluding that any contravention in policy implementation may lower employee's job satisfaction, occupational commitment and trust in decision makers (Coetzee, 2005; Colquitt *et al.*, 2001). Thus, in increasing the possibility for an organisation's success, managers should not underestimate the importance of fairness perception of employees in the context of reward distribution since it is critical to employees having a positive attitude towards their work.

Also, demographic variables such as gender, age and job position were considered regarding their relationship to job satisfaction, organisational commitment, work motivation and perception of fairness. The study found that employees within 20-30 years of age were significantly and fairly motivated than those above 60 years of age. Thus, broadly, youthful employees in the banking sector of Ghana seemed more motivated in their job than those above 60 years. As such it is not unreasonable to suggest that employing more youthful staff is good for banks in Ghana. This is not to say that attention should not be paid to the needs of older employees since their experience is also critical to the successful operation of banks. Also, the position of employees in the banking sector was of importance in determining their commitment level to the organisation. Thus, employees with higher positions and supervisors were generally found to be more committed than those on lower ranks. This perhaps may be due to the rewards received by these categories of workers. It is not therefore unreasonable to suggest that a fair and transparent promotion policy could contribute to employee commitment and satisfaction. Thus, the present study supports previous researches that advance that, justice perception is a vital factor that significantly affects job satisfaction and occupational commitment.

Conflict of Interests

The author has not declared any conflict of interests.

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