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The role of knowledge and knowledge management in sustaining competitive advantage within organizations: A review

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The utilization of knowledge and knowledge management (KM) is being highly considered as an organizational capability and a potential source of sustainable competitive advantage (SCA). This paper aims at figuring out the roles of knowledge and knowledge management in achieving SCA within organizations. Assuming knowledge and KM practice as strategic and tactical element respectively, a systematic literature review is carried out from definitions, derivations to interrelations, covering both traditional and contemporary theoretical studies. Through comparison and summarization, it is found that knowledge and knowledge management potentially affects the process of SCA from different aspects. And it suggests that firms re-bundle strategic knowledge from various types and transform it by using knowledge management in order to sustain competitive advantage under today's new business environment characterized by dynamic, discontinuous and radical pace of change.

Key words: Knowledge, knowledge management, sustainable competitive advantage (SCA), review.

INTRODUCTION

Due to the current pace of change, knowledge and knowledge management (KM) have become so important for business organizations (Tyler et al., 2007). As Ruggles (2000) stated, when change occurs, whether external or internal to an organization, people need new knowledge to do their work. What they know before becomes obsolete. When change comes rapidly, the organization cannot rely on its old, informal ways of gaining and transferring knowledge. They simply will not keep pace with the leading edge.

Thus, one task of knowledge management is to help organizations to enhance and expand the innovation process (Karadsheh et al., 2009) to maintain their competitive advantage. According to Okunoye and Bertaux (2008), the benefit and strategic importance of knowledge management is in the ability of an organization to correctly identify which knowledge resources they can improve to gain sustainable competitive

advantage. Also, since knowledge has been classified into different types (Gao et al., 2008; Hicks et al., 2006; Wiig, 2004), another task of knowledge management is not to manage all knowledge, but to manage the knowledge that is most essential to the development of the organization.

From the strategic management viewpoint which focuses on understanding the sources of sustainable competitive advantage (Barney, 2001; Priem and Butler, 2001), a wide variety of factors have been shown having a significant impact on the ability of organizations to obtain sustainable competitive advantage, including the relative competence development of an organization (Johannessen and Olsen, 2003), an organization's ability to differentiate its products or services (Johannessen and Olsen, 2003; Teece et al., 1997), etc. Knowledge management has also been described for its possible role in creating sustainable competitive advantages for organizations (Johannessen and Olsen, 2003; Grant, 1996; Lado and Wilson, 1994). Although the proposition that knowledge management might be able to create sustainable competitive advantage for organizations is

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agreeable, efforts in this issue are still relatively under-developed, from both theoretical and empirical perspectives. Therefore, this paper attempts to review amounts of related researches to establish a theoretical base of the roles of knowledge and knowledge management in sustaining competitive advantage, which could be used in an empirical way for future work.

This paper explains the definition of sustainable competitive advantage and reviewed previously adopted research approaches mainly including the resource based view, the generic strategies, the industry structure and the value chain. It also discussed knowledge as the source of sustainable competitive advantage (SCA) from the definitions of knowledge and specific types of knowledge and focuses on knowledge management as a tool of building SCA from the definitions as well as the tasks that KM can do for SCA. The integrated framework of the roles of knowledge and knowledge management in SCA is derived accordingly. Finally, some conclusions are drawn.

SUSTAINABLE COMPETITIVE ADVANTAGE (SCA)

Before offering a formal conceptual definition of SCA, it may be useful to consider the meaning and implications of the three individual terms: sustainable, competitive and advantage. Webster's Dictionary defines the term "advantage" as the superiority of position or condition, or a benefit resulting from some course of action; "Competitive" is defined as relating to, characterized by, or based on competition (rivalry); and "sustain" means to keep up or prolong. Thus, the meaning of the sustainable competitive advantage can be interpreted as "to have superior position or condition over its competitor in a long-term period by adjusting to the endless changes around the world".

Actually, the more commonly-used concept is the competitive advantage. Porter (1985), Christensen and Fahey (1984), and Kay (1995) noted that the term "competitive advantage" have traditionally been described in terms of the resources and attributes of an organization that permit it to the best performance from other competitors in the same industry or product market (Chaharbaghi and Lynch, 1999). Barney (1986), Peteraf (1993) and Teece et al. (1997) agreed that the firm's competitive advantage derives from characteristic resources that are heterogeneous, rare, and difficult to imitate. Besanko et al. (2000) stated when a firm earns a higher rate of economic profit than the average rate of economic profit of other firms competing within the same market, the firm has a competitive advantage in that market. Ghemawat and Rivkin (2001) defined the competitive advantage as "a firm such as... that earns superior financial returns within its industry (or its strategic group) over the long run is said to enjoy a competitive advantage over its rivals." Peteraf and Barney (2003) also claimed that an

enterprise has a competitive advantage if it is able to create more economic value than the marginal (breakeven) competitors in its product market." Barney (2008) defines competitive advantage as the ability to create more economic value than competitors. Stevenson (2009) advocated that competitive advantage results from a firm's effectiveness in using organizational resources to satisfy customers' demand when compared to competitors. According to Ramadan (2010), competitive advantage is a term given to the source of a firm's ability to win business and out-perform competitors at a point in time". Wei et al. (2010) sees that competitive advantage is the aspects enterprises have to go beyond or better than competitors in the specific business. Wu (2010) described the competitive advantage as the value creation, value capture and value protect.

What is sustainable competitive advantage?

As the global competition becomes increasingly fierce, how to sustain competitive advantage or achieve sustainable competitive advantage starts obtaining more attention. Barney (1991) noted that when an organization is implementing a value creating strategy not simultaneously being implemented by any current or potential rivals, then the organization has a competitive advantage. And when other organizations are unable to copy the benefits of this strategy, it confirms that the organization has a sustainable competitive advantage. In 2008, Barney distinguished two types of competitive advantage: temporary and sustainable competitive advantage. According to him, competitive advantage typically results in high profits, but these profits attract competition, and competition limits the duration of competitive advantage in most cases, therefore, most competitive advantage is temporary. On the other hand, some competitive advantages are sustainable if competitors are unable to imitate the source of advantage or if no one conceives a better offering. Furthermore, Hani and Al-Hawary (2009) refers to sustainable competitive advantage as, to create some barriers that make firm's performance imitation difficult. That is, since the competitive advantage is at the heart of firm's performance, it should protect itself from being spoiled and assimilate new sources of technologies, skills, and core competencies. Additionally, Seubert et al. (2001) and Halawi et al. (2005) pointed out that sustainable competitive advantage is no longer rooted in physical assets and capital, but in effective channeling of intellectual capital.

Various definitions of sustainable competitive advantage are provided in Table 1. Worthy to note, Coyne (1986) assumed types of capability gaps as sources of sustainable competitive advantage, which a firm could possess over competitor, such as functional/business system gaps, position gaps, regulatory/legal gaps, and cultural or organization/ managerial quality gaps. Day and

Table 1. Various concepts of the sustainable competitive advantage.

No	Author(s) and date	Main contributions
1	Porter, 1985	Introduces idea of the "value chain" as the basic tool for analyzing the sources of competitive advantage (CA).
2	Coyne, 1986	Explanation of the conditions needed for a sustainable competitive advantage (SCA) to exist; idea of capability gaps.
3	Day and Wensley, 1988	Potential sources of advantage are superior skills and superior resources; in assessing ways to achieve sustainable competitive advantage (SCA), both competitor and customer perspectives should be considered.
4	Hamel and Prahalad, 1989	A firm should not search for a sustainable competitive advantage (SCA) it should learn how to create new advantages to achieve global leadership.
5	Prahalad and Hamel, 1990	Sustainable competitive advantage (SCA) results from core competencies; firms should consolidate resources and skills into competencies that allow them to adapt quickly to changing opportunities.
6	Barney, 1991	Discusses four indicators of the potential of firm resources to generate SCA: value, rareness, inability to be imitated and imperfect substitution.
7	Peteraf, 1993	Discusses four conditions which must be met for SCA: superior resources (heterogeneity within an industry), exposit limits to competition, imperfect resource mobility, and extant limits to competition.
8	Bharadwaj et al., 1993	Evaluates sustainable competitive advantage (SCA) in a services marketing context; an SCA exists only if it is recognized by customers.
9	Day and Nedungadi, 1994	A firm's use of strategy and reaction to the environment depends on its orientation (customer-oriented versus competitor-oriented); CA is based on this orientation.
10	Hunt and Morgan, 1995	Compares neoclassical theory and comparative advantage theory of the firm; comparative advantage in resources can translate into a competitive advantage in the marketplace; offers categorization of resources.
11	Oliver, 1997	Proposes a model of firm heterogeneity which suggests that both resource capital and institutional capital are indispensable to SCA.
12	Chaharbaghi and Lynch, 1999	Sustainable competitive advantage is the protection attributes and resources of an organization that allow it to out-perform others.
13	Coplin, 2002	Sustainable competitive advantage is a company's own resources and capabilities must therefore be difficult to imitate, not easily substituted by other resources or capabilities.
14	Pearce and Robinson, 2005	The sustainable competitive advantage is sustainable strategies that set the organization apart from competitors.
15	Barney, 2008	Sustainable competitive advantage is unable competitors to imitate the source of advantage or if no one conceives of a better offering.
16	Hani and Al-Hawary, 2009	The sustainable competitive advantage creates some barriers that make firm's performance imitation difficult.

Wensley (1988) and Halawi et al. (2005) focused on the elements involved in competitive advantage. Specifically, they identified two categorical sources of competitive

advantage: superior skills, which are "the distinctive capabilities of personnel that set them apart from the personnel of competing firms; and superior resources,

which are "the more tangible requirements for advantage that enable a firm to exercise its capabilities". In the present environment, the personnel truly understand customers' needs and are able to foster business-intimate relationships with them, and then they most certainly qualify as a sustainable competitive advantage (Srivastava et al., 1998).

Considering all these definitions, there are four points that can be extracted. First, the subjects of sustaining competitive advantages are resources and skills. Some researchers have elaborated on the specific skills and resources that can contribute to a sustainable competitive advantage. Barney (1991) stated that not all firm resources hold the potential of sustainable competitive advantages; instead, they must possess four attributes: rareness, value, inability to be imitated, and inability to be substituted. Hunt and Morgan (1996) proposed that "potential resources can be most usefully categorized as financial, physical, legal, human, organizational, informational, and relational".

Secondly, the process of sustaining competitive advantages is to transform resources and skills into competencies or capabilities. Prahalad and Hamel (1990) suggested that firms should combine their resources and skills into core competencies, loosely defined as that which a firm does distinctively well in relation to competitors. Bharadwaj et al. (1993) discussed the specific combinations of skills and resources that are unique to service industries. For example, they propose that the greater the complexity and co specialization of assets needed to market a service, the greater the importance of innovation as a source of comparative advantage will become. They also propose that brand equity becomes an important source of comparative advantage in service industries as the level of service offered becomes more intangible and when consumers have a great need to overcome perceptions of risk. Also, the sustainable competitive advantage can be gained by adopting management approaches that satisfy customers through cost competitiveness, high quality products and services, speed and innovation (Bateman and Snell, 1999).

Thirdly, the objective of sustaining competitive advantages is to be better than or different from competitors or to unable competitors to imitate. Coplin (2002) point out that to sustain a competitive advantage, a company's own resources and capabilities must therefore be difficult to imitate, not easily substituted by other resources or capabilities, incapable of being rapidly developed elsewhere, and firmly attached to the company that deploys or uses them. Peteraf (1993) noted that sustainable competitive advantage eludes definition but can be largely defined as the quality of an organization that enables it to outperform its competitors and sustain above normal returns (Jeyavelu, 2007).

Barney (2008) defines competitive advantage as being sustainable if competitors are unable to imitate the source of advantage or if no one conceives of a better

offering.

The fourth point is to stand in a strategic point of view, to review the sustaining competitive advantages as a dynamic process. Pearce and Robinson (2005) and Czinkota et al. (1997) agreed that sustainable competitive advantage is sustainable strategies that set the organization apart from competitors, for example, price strategy, strategy-structure fit, communication strategy or cooperation between functional areas (Ramasodi, 2007). Scholar Xuewei (2002) suggests that if enterprises want to truly have sustainable competitive advantage, they should be able to withstand the upheaval environment and create new competitive advantage in the process. According to leadership as continuum, Jiajia (2007) describes the process of sustainable competitive advantage for competitive advantage as continuum. That is, enterprises should carry out another new competitive advantage before the decline of the current competitive advantage. The enterprises build competitive advantage as continuum in mutual connection and form continuous corrugated track (Wei et al., 2010).

To sum up, the subjects of SCA are resources and skills. Resources also refer to what someone calls "physical resources" while skills are also referred to as intellectual resources. And both resources and skills can be regarded as the value capture part in the value chain viewpoint. The media of SCA is competency or capability. The vital issue is how to transform the subjects of SCA into the media, which is also interpreted as the value creation part in the value chain viewpoint. The objectives for SCA to achieve can be in forms of financial returns in the accounting viewpoint, or capability gaps, or the value protection part in the value chain viewpoint, or customer recognition from business operation field. Finally, the subject-media-objective process of SCA needs to be kept updated in order to adapting to the fast changing environment.

Thus, these four elements construct the basic idea of the sustainable competitive advantage, none of which is dispensable (Figure 1). To further extend the concept of SCA, there emerge various approaches of research. The following takes a closer look at some classical ones: the resource-based view (RBV), the generic strategic approaches, the industry structure and the value chain.

Approaches of researches on sustainable competitive advantage

The resource-based view (RBV)

This is regarded as one of the most influential theories in the history of management research, especially in the strategic management deployment (Wernerfelt, 1984; Rumelt, 1984; Barney, 1986, 1991; Mahoney and Pandian, 1992; Amit and Schoemaker, 1993). The essential idea of RBV is to leverage the companies' resources,

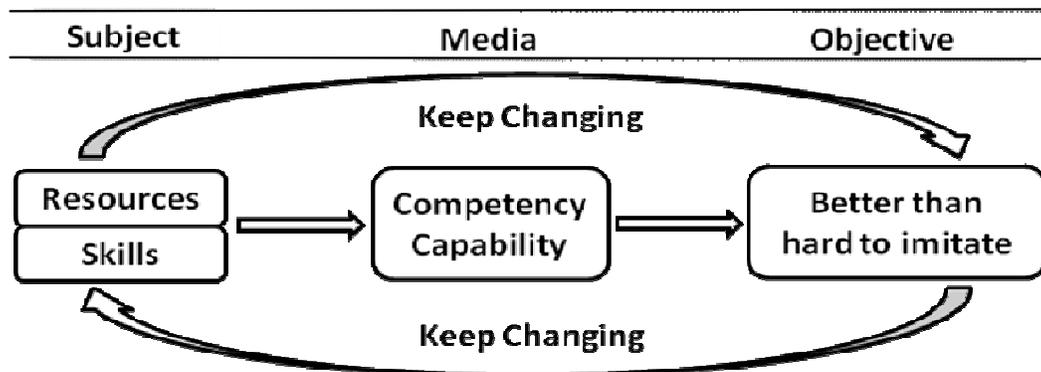


Figure 1. The process of sustaining competitive advantage.

particularly the internal sources (Kraaijenbrink et al., 2010), and core competencies to generate a sustainable competitive advantage which, in turn, translates into better performance.

RBV emphasizes the unique assets and capabilities that make the difference in creating competitive advantage for an organization. Therefore, it indicates that management efforts should be focused toward collecting (Wernerfelt, 1984; Barney, 1991), developing and exploiting these strategic resources (Hafeez et al., 2002) for the sustainability of competitive advantage. Lynch (2006) has identified seven main elements that comprise the resource-based view (RBV) to obtain sustainable competitive advantage (SCA) as shown in Figure 2.

Claudia (2006) distinguished organizations' strategic capabilities to sustain competitive advantage, including valuable to buyers, rare, robust and non-substitutable (Johnson et al., 2005). It assumed that the organization's ability to create valuable, in the sense that it exploit opportunities and/ or neutralizes threats in a firm's environment, and rare among a firm's current and potential competition, organization resources makes those resource difficult to imitate, or there cannot be strategically equivalent substitutes for it by other firms which leads higher organizational performance and sustainable competitive advantage. Dess et al. (2007) summarized these criteria as shown in Table 2, with strategic implications presented in Table 3. It shows that when all four criteria are satisfied, the competitive advantage can be sustained over time (Dess et al., 2007).

To sum up, RBV, standing in the strategic level, sees organization as a set of resources, from which a sustainable competitive advantage can be obtained if the organization effectively deploys these resources featured with being scarce, low interchangeability, and being hard to imitate (Alipour et al., 2010), in its product-markets. It can be concluded that RBV provides a good starting point for SCA from how to identify the potential subjects or sources of SCA within organizations from a strategic aspect. However, hardly any external sources have been

touched. Let alone how to tactically transform the identified resources into SCA.

The three generic strategic approaches

The second approach is the three generic strategic approaches proposed by Porter (1998), which covers overall cost leadership, differentiation and focus. Each of these three strategic options represents an area that every business and many not-for-profit organizations can usefully explore and every business needs to choose one of these in order to compete in the market place and gain sustainable competitive advantage (Lynch, 2006).

The three options can be explained by considering two aspects of the competitive environment. The first aspect is the source of competitive advantage. There are fundamentally only two sources of competitive advantage. These are differentiation of products from competitors and low costs. The second one is the competitive scope of the target customers. It is possible to target the organization's products as a broad target covering most of the market place or to pick a narrow target and focus on a niche within the market.

Effectively implementing any of these generic strategies usually requires total commitment and supporting organizational arrangements that are diluted if there is more than one primary target. These generic strategies are together in the well-known diagram as shown in Figure 3 with several common implications of the generic strategies presented in Table 4.

Generally, the three generic strategic approaches focus mainly around cost, products, and markets from the angle of comparing with its competitors. Conclusively, these approaches specify the objectives of SCA into three different categories also from a strategic aspect, but how to figure out the original unique resources or skills that the company possesses is still untouched. Let alone how to achieve those objectives by applying those resources or skills.



Figure 2. Resource-based view: the seven main elements (Source: Lynch, 2006).

Table 2. Criteria assessing sustainability of resources and capabilities (source: Dess et al., 2007).

Is the resource or capability	Implication
Valuable	Neutralize threats and exploit opportunities
Rare	Not many firms possess
Difficult to imitate	i. Physically unique ii. Path dependency (how accumulated over time) iii. Causal ambiguity (difficult to disentangle what it is or how it could be re-created) iv. Social complexity trust, interpersonal Relationships, culture, reputation)
Difficult to substitute	No equivalent strategic resources or capabilities.

Table 3. Criteria for sustainable competitive advantage and strategic implication (source: Dess et al., 2007).

Is the resource or capability					Implications for competitiveness
Valuable	Rare	Difficult to imitate	Without substitute		
No	No	No	No	No	Competitive disadvantage
yes	No	No	No	No	Competitive parity
yes	yes	No	No	No	Temporary competitive advantage
yes	yes	yes	yes	yes	Sustainable competitive advantage

Adapted from Barney (1991).

Perspective of industry structure

The third approach is from the perspective of industry structure, which has a strong influence in determining the competitive rules of the game. According to Porter

(1998), the state of competition in an industry depends on five basic competitive forces, including the bargaining power of suppliers, the bargaining power of buyers, the threat of potential new entrants, the threat of substitutes and the extent of competitive rivalry (Figure 4).

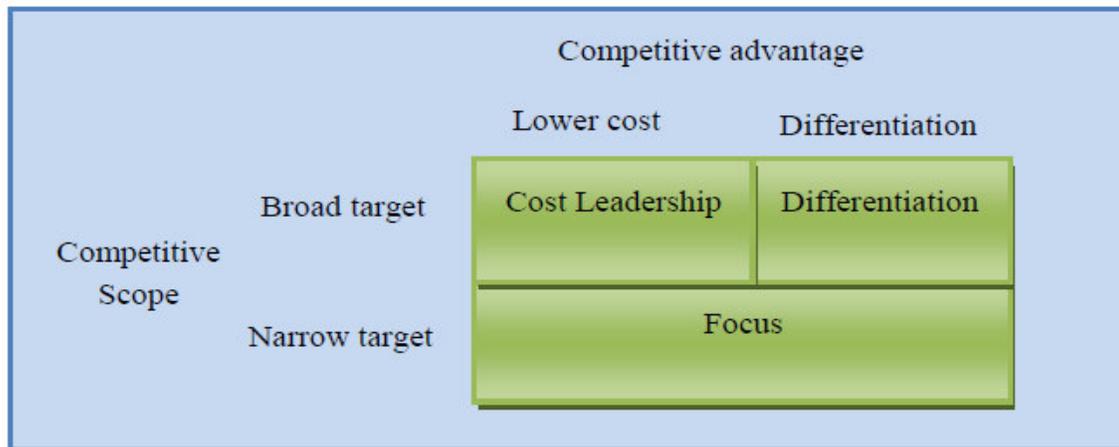


Figure 3. Generic strategies (source: Porter, 1998).

Table 4. Several common implications of the generic strategies (source: Porter, 1998).

Original strategy	Commonly required skills and resources	Common organizational requirements
Cost leadership	<ul style="list-style-type: none"> i. Sustained capital investment and access to capital. ii. Process engineering skills. iii. Intense supervision of labor, iv. Products designed for ease in manufacture. v. Low-cost distribution system. 	<ul style="list-style-type: none"> i. Tight cost control. ii. Frequent detailed control Reports. iii. Structured organization and responsibilities, iv. Incentives based on meeting strict quantitative targets
Differentiation	<ul style="list-style-type: none"> i. Strong marketing abilities. ii. Product engineering Creative flair. iii. Strong capability in basic research. iv. Corporate reputation for quality or technological leadership. v. Long tradition in the industry or unique combination of skills drawn from other businesses. vi. Strong cooperation from channels 	<ul style="list-style-type: none"> i. Strong coordination among functions in R&D, product development, and marketing. ii. Subjective measurement and incentives instead of quantitative measures. iii. Amenities to attract highly skilled labor. Scientists or creative people
Focus	Combination of above policies directed at the particular strategic target,	Combination of the above policies directed at the particular strategic target

Such analysis is to investigate how the organization needs to form its strategy in order to develop opportunities in its environment and protect itself against competition and other threats. Johnson et al. (2005) pointed out that this framework should be used at the strategic level and the five forces are not independent from each other. The questions: what are the connections amongst each other? and what are the key drivers in the macro environment? need further investigation. Lynch (2006) also stated that the general principles can perhaps be applied to public service and not-for-profit organizations where they compete for resources, such as government funding or charitable donations.

The industry structure approach extends the subjects or sources of SCA into outside the company self. But it is

still preferred in a strategic level and how to tactically convert these resources into SCA is still under investigated.

The value chain approach

The last approach to be introduced here is the value chain approach which describes the activities within and around an organization which together, create a product or service. It is the cost of these value activities and the value that they deliver that determines whether or not best value products or services are developed (Johnson et al., 2005). The concept was used and developed in relation to competitive strategy by Porter and Kramer

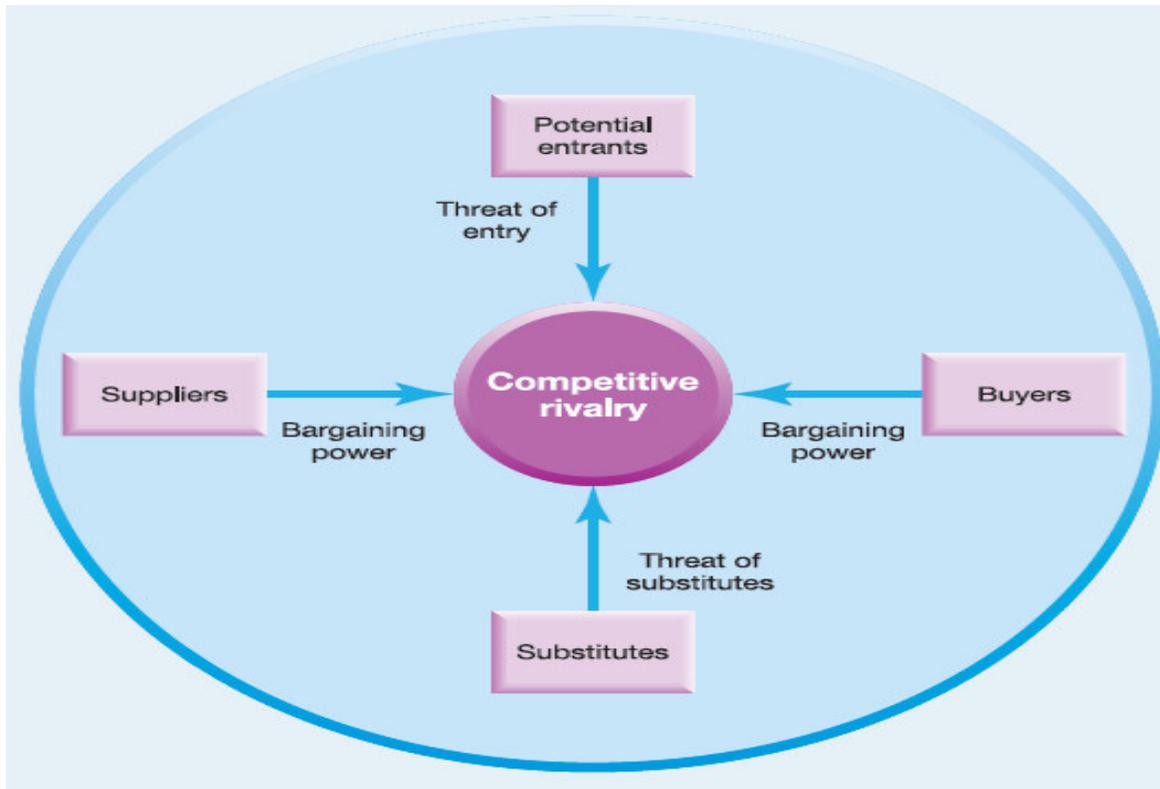


Figure 4. The five forces framework (Source: Johnson et al., 2005).

(2006).

The value chain is composed of primary business activities and support business activities as displayed in Figure 5. Primary business activities are directly concerned with the creation or delivery of a product or service and can be grouped into five main areas including: inbound logistics, operations, outbound logistics, marketing and sales and after sales service. Each of these groups of primary activities is linked to support activities. Support activities help to improve the effectiveness or efficiency of primary activities. They can be divided into four areas including: firm infrastructure, human resources management, technology development and procurement.

The value chain is entrenched in a firm's value system which includes: suppliers, buyers, and distribution channels. Competitive advantage, thus, depends on how well a firm coordinates the entire value system. The activities inside the value chain are interlinked and this linkage creates interdependencies between the firm and its external environment.

In addition to the analysis of the company's own value chain, Porter argued that an additional analysis should also be undertaken. Organizations are part of a wider system of adding value involving the supply and distribution value chains and the value chains of customers. This is known as the value system (Lynch, 2006). In addition, Johnson et al. (2005) saw that in most industries, it is rare for a single organization to undertake in-house, all

the value activities from the product design through the delivery of the final product or service to the final consumer. There is usually specialization of role and any one organization is part of the wider value network. The value network is the set of inter-organizational links and relationships that are necessary to create a product or service (Figure 6).

Competitors may or may not use the same value system: some suppliers and distributors will be better than others in the sense that they offer lower prices, faster service, more reliable products, etc. Real competitive advantage may come from using the best suppliers or distributors. New competitive advantage may be gained by using a new distribution system or obtaining a new relationship with a supplier. An analysis of this value system may also be required. This will involve a resource analysis that extends beyond the organization itself. Value chain and value system analysis can be complex and time consuming for the organization. This is where the key factors for success can be used. If these have been correctly identified, then they will provide the focus for the analysis of added value that follows. Key factors may well be those factors that add value to the product or service (Lynch, 2006).

The value chain approach clearly describes all the related parties within the same value chain in details, from intra-organization to inter-organization; and the competitive advantage derives from the values added

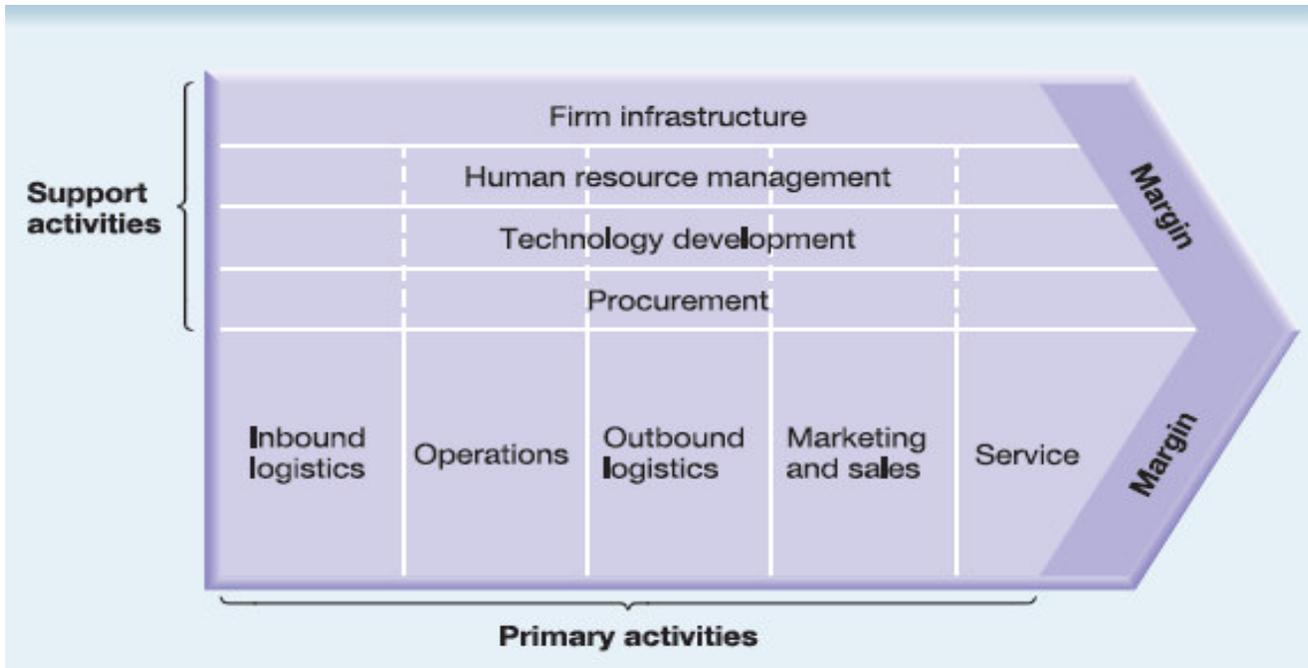


Figure 5. The value chain (Source: Porter and Kramer, 2006).

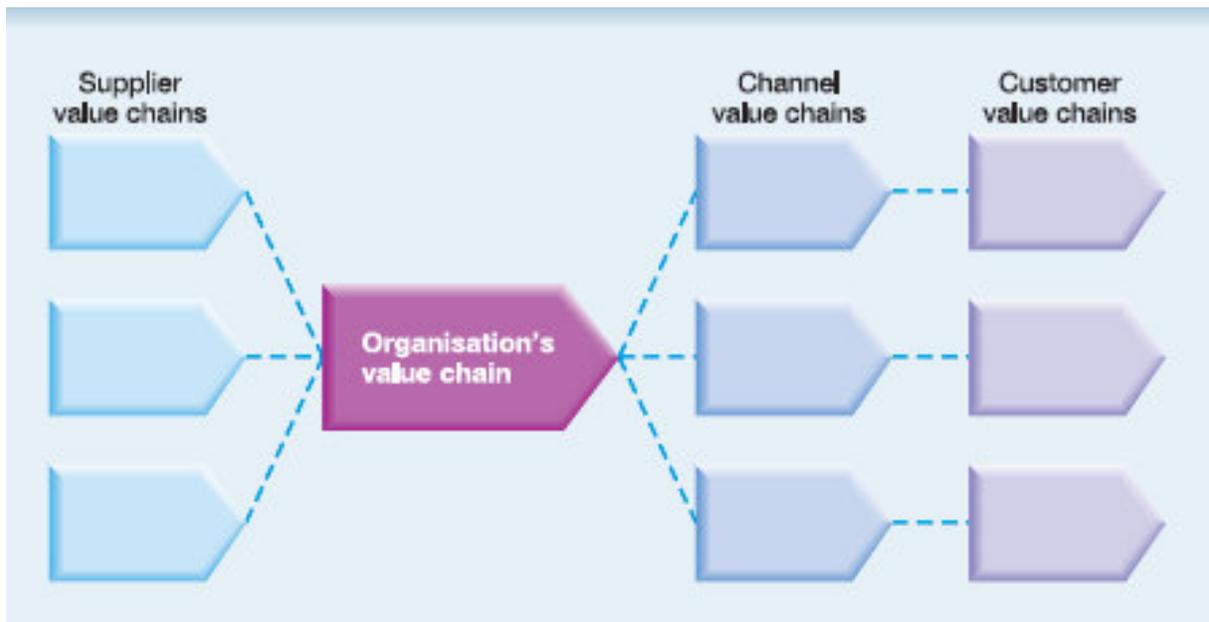


Figure 6. The value network (Source: Johnson et al., 2005).

from any possible steps. How to identify the potential SCA subjects are less explained and how to apply it into reality are still unclear. The main contribution lies on the bird view of the whole operation process.

To summarize all the previous related approaches (some as aforementioned), it can be found that:

1. The efforts that have been made are largely on how to identify the potential unique sources of sustainable competitive advantage;
2. The efforts that have been in lack are how to transform the identified sources into competency or capability at a tactical level.

Knowledge as the source of SCA

Understanding sources of sustainable competitive advantage has become a major area of study in the field of strategic management (Porter, 1985; Barney, 1991; Peteraf, 1993; Flint and Van Fleet, 2005; King, 2007). So, to comprehend the sustainable competitive advantage, this section takes a close look at the subjects or sources of SCA from a strategic standing point.

First, to be subjects of SCA, the sources of the organizations should be convertible, inimitable and valuable. The resource-based view (RBV) of firm discusses the nature of resources possessed by organizations and details the qualities that such resources must maintain in order to be converted into sustainable competitive advantages over time (Barney, 1991; Wernerfelt, 1984). Advocates of this theory (Barney, 1991; Markides and Williamson, 1996) suggest that, in order for a resource to qualify as a source of sustained competitive advantage, the resource must add value to the firm, it must be rare, it must be inimitable and it must be non-substitutable.

Secondly, the sources of SCA are categorized into various forms. Barney and Wright (1998) identified three basic types that provide the firm with sustainable competitive advantage: physical resources, human resources and organizational resources. Physical resources include the company's factory, equipment and finances. Human resources include intellectual property, knowledge of business processes and tacit knowledge, skills, judgment and intelligence of the company's employees; and organizational resources include the company's structure, planning, controlling and coordination (Ramadan, 2010).

Another more general categorization has only internal and external sources. Internal sources include resources that are owned by the organization, activities, and skills that make it superior to its competitors. External sources are the external environment that has been a source of competitive advantage. It contains a variety of factors (political, economic, demographic and technological) that affect organizations positively or negatively. To achieve SCA, the organization relies on internal sources more. If the factors of external environment present opportunities for the organization and have the proper conditions, the advantage cannot be achieved only through the resources and capabilities of the organization but through its ability to deal with those conditions and investment opportunities.

More specifically, the organization must possess the ability to effectively and efficiently exploit the full potential of its resources, in order to develop and maintain any potential competitive advantages (Barney, 1997; Adams and Lamont, 2003). Wright et al. (1994) showed that human resources (HR) meet the criteria for being a source of sustainable competitive advantage. Coff (1994) discussed that human resources are a main source of sustainable advantage because of causal ambiguity and systematic information making them inimitable. Gratton (1997) also recognized that sources of competitive

advantage have turned from financial resources to technology resources and now to human capital. The theory of competence-based competition argues that core competencies are the source of sustainable competitive advantage (Hafeez et al., 2002).

In other words, success of organization in investigating the sustainable competitive advantage does not depend primarily on the size of the budget or the products supporting technologies. It really depends on employee's attitudes, core competencies and skills (Al-Rfou and Trawneh, 2009). Memon (2009) agrees that the strategic human resources management or the human capital is a means of gaining competitive advantage through one of the most important asset: its people as its crucial wealth, success and competitive advantage of the organization. Thus, to sustain competitive advantage, in other words, is to utilize the knowledge of people to contribute to the organization.

What is knowledge?

The basic and most accepted meaning of knowledge is "justified true belief." As Webster (1961) defined, knowledge refers to a clear and certain perception of something – the act, the fact, or the state of understanding. Other various interpretations of knowledge derive from the research backgrounds of the definers. Table 5 illustrates some classical examples.

To overview all these definitions, there are several categories that can be figured out: 1) knowledge is different from data and information; 2) knowledge can be tacit and explicit; 3) knowledge can be personal or organizational; 4) knowledge has its own life cycle. But to keep elaborating the topic of SCA, all the contents of knowledge are focused, standing in the point of organization.

Which knowledge is for SCA?

Davenport (1997) argues that knowledge is neither data nor information. According to him, "data are simple, absolute facts and raw material that, in and of themselves, represent observations, or facts out of context, and therefore, not directly meaningful and may be of little use". Information is data that have been linked with other data and converted into useful context for specific use. Knowledge goes a step further; it is that which is believed, and value based on the meaningful organized information from the human mind through experience and communication with guidance for action and is a much more implicit entity.

Following this logic, knowledge is embodied in a general framework based on the integrated learning and thinking of the information derived from data from multiple sources, to be the knowledge as an integrated and interlinked series of stages, ending with wisdom, as

Table 5. Various concepts of knowledge.

No.	Author(s) and date	Definition
1	Darling, 1996	Intangible assets of the organization, such as the social basis of the state and includes extensive experience and excellent management style and culture accumulated.
2	O'Dell and Grayson, 1998	Define knowledge to be information in action.
3	Davenport and Prusak, 1998	A fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of experts. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms".
4	Beijerse, 1999	The capability to interpret data and information through a process of giving meaning to these data and information; and an attitude aimed at wanting to do so.
5	Stromquista and Samoff, 2000	The Knowledge is systematic experiments and test for the hypotheses that refer to objective and explanatory model for understanding the surroundings environment.
6	Smith, 2001	A human, highly personal asset representing the shared expertise and efforts of networks and alliances.
7	Nonaka et al., 2001	Define knowledge that it is explicit knowledge and tacit knowledge.
8	Wiig, 2004	Facts, perspectives and concepts, mental reference models, truths and beliefs, judgments and expectations, methodologies, and know-how. Understanding how to create new meanings out of isolated information.
9	Awad and Ghaziri, 2004	Higher level of abstraction that resides in people's minds. Includes perception, skills, training, common sense, and experiences.
10	Desouza, 2005	Placement of information in its larger context a necessary condition for understanding.
11	Yeh, 2005	Knowledge refers to the ideas or understandings that an entity creates and/or possesses that are used to take effective action to achieve the entity's goals.
12	Leng, 2005	Sees that knowledge has two basic definitions of interest. First, Knowledge is defined as structure of information such as facts, opinions, ideas, theories, principles, models (or other framework). Second, Knowledge is also defined as person's stage of being for instant, ignorance, awareness, familiarity, competencies, intuitions, understanding, facility and etc.
13	Laihonen, 2006	Regarded knowledge as containing an interpretation of a knower.
14	Williams, 2006	Characterized knowledge as is dynamic, strategic, political, and subject to change.
15	Laudon and Laudon, 2006	Define knowledge assets as organizational knowledge regarding how to efficiently and effectively perform business processes and create new products and services that enables the business to create value.
16	Endres et al. 2007	Define knowledge from an organizational point of view. Organization is considered a valuable resource and potential source of capabilities and competencies for innovations and new product development, it is consists of information, technology, know-how, and skills. Value and sustainability are created from the integration of these resources better than competitors.
17	Gao et al. 2008	Knowledge can be further defined as subjective or objective; or explicit or tacit/implicit.
18	Vandaie, 2008	From the epistemological perspective, knowledge is known to be either tacit or explicit.

Table 5. Contd.

19	Seidler and Hartmann, 2008	Knowledge is a potentially significant resource to the firm as it may possess valuable, rare, inimitable and non-substitutable characteristics particularly if it has a tacit dimension.
20	Faucher et al. 2008	Knowledge is considered to be information that has been processed in some meaningful ways.
21	Karadsheh et al. 2009	Knowledge is the result of merging information with practice, perspective and expression, resulting in insinuation and presents approaches and plans on which decision is based on.
22	Al-Zayyat et al. 2009	State two concepts for the knowledge: first as an economic resource; second as a source of competitive advantage making significant impact on the traditional management approach and demanded a model change. This in turn created an wealth of intellectual capital, human capital, structural capital, knowledge capital, customer capital, human intellectual assets, intangible assets, knowledge worker, and competent employee, all emphasizing the utilization of a rare and special kind of human resource.



Figure 7. Series of knowledge.

illustrated in Figure 7. Therefore, knowledge is on the basis of a real function to the process of obtaining the information, sharing it, interpreting and transferring it into stable scientific facts that are intellectually used by the individual, team or organization.

Bellinger et al. (2004) modified a hierarchy of knowledge, which also transits from data to information, knowledge, and wisdom through an increase of connectedness and understanding. The model uses an interesting framework: it is through understanding that data is transformed into information, then into knowledge, and finally into wisdom to create a result at a higher level. Faucher et al. (2008) redefined the scope of the hierarchy by describing it as a pyramid with two clear boundaries of existence and enlightenment. Existence describes the inclusive environment that humans can capture and create data, as data are a very basic processed result of human watching of existence; while enlightenment is the highest form of understanding (Figure 8).

Thus, distinguishing the knowledge from data and information and considering the functions or importance of data, information, knowledge and wisdom, the source of SCA lies on the knowledge and wisdom which is unique, valuable and inimitable for achieving sustainable competitive advantage.

Following the classifications of Zack (1999), Maier and Remus (2001), Haggie and Kingston (2003), and Gottschalk (2002), Schwartz (2006) further classified

knowledge into core knowledge, advanced knowledge and innovative knowledge.

Core knowledge is minimum span and level of knowledge required just to play the game. Having that level of knowledge and capability will not assure the long-term competitive viability of a firm, but does present a basic industry knowledge barrier to entry. Core knowledge tends to be commonly held by members of an industry and therefore provides little advantage other than over non members. Advanced knowledge enables a firm to be competitively viable. The organization may generally have the same level, span, or quality of knowledge as its competitors although the specific knowledge content will often vary among competitors, enabling knowledge differentiation. Organizations may choose to compete on knowledge head-on in the same strategic position, hoping to know more than a competitor. They may instead, choose to compete for that position by differentiating their knowledge. Innovative knowledge is that knowledge that enables an organization to lead its industry and competitors and to significantly differentiate itself from its competitors. Innovative knowledge often enables a firm to change the rules of the game itself. This means each organization's general awareness of and orientation to the link between knowledge and strategy tends to be somewhat unique and may, itself, represent an advantage. Regardless of how knowledge is categorized based on content, every organization's strategic knowledge can.

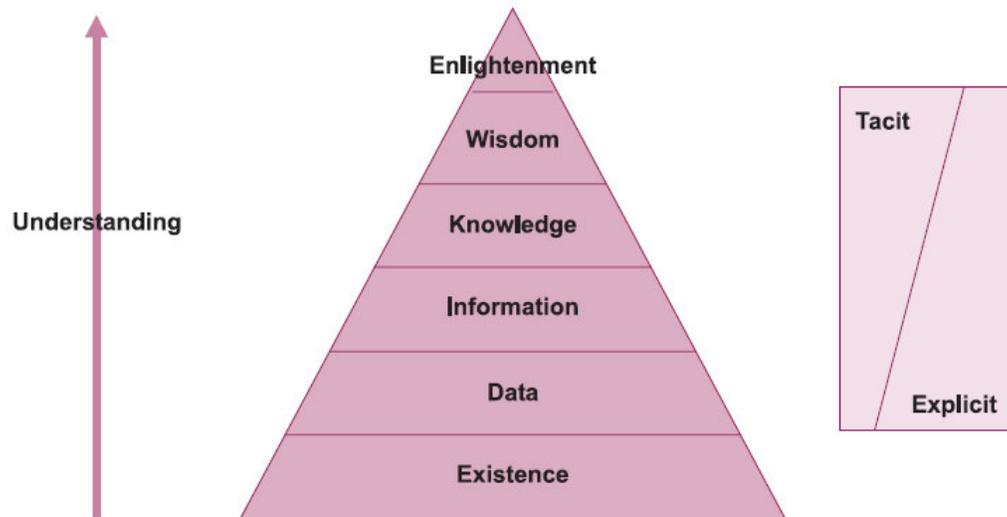


Figure 8. The extend knowledge management pyramid.

be categorized by its ability to support a competitive position

Thus, it is the strategic knowledge consisting of core, advanced and innovative knowledge that constructs the source of sustainable competitive advantage.

Knowledge management as a tool of building SCA

Under the light of the previous researches, some researchers (Davenport and Prusak, 1998; Zack, 1999; Alavi and Leidner, 2001) noted that competitive advantage is realized only when the organization's tracking methods and ways are efficient and distinctive and one of those ways is through the knowledge management of the organization that have achieved competitive advantage not for a specific period, but a long term.

Gupta and McDaniel (2002) studied knowledge management and competitive advantage by examining the vital link between the management of knowledge in contemporary organizations and the development of a sustainable competitive advantage. The used variables are conceptualized in terms of organizational effectiveness, efficiency, core competency, costs; knowledge acquirement, knowledge filtering, knowledge configuration, knowledge dissemination and knowledge application. Goh (2005) also identified that the field of knowledge management has emerged strongly as the next source of competitive advantage.

Ong and Ismail (2008) emphasized that firms can achieve the sustainable competitive advantage by information technology facilities. He sees that even if a firm owned the most sophisticated information technology facilities which are impossible for the competitors to imitate or substitute, and for sure it is rare, but if there is no knowledgeable personnel in the organization, or the

knowledgeable personnel in the organization is not willing to utilize these facilities, these facilities would not generate any value to the organization. Obviously, to achieve sustainable competitive advantage, knowledge, willingness to use (operations) and availability of facilities must co-exist.

Thus, the question is "how should the organizations develop a knowledge management system to coordinate people, technology and infra-structure to create advantages competitiveness and sustainability in business environments?"

What is knowledge management?

Researchers and scholars defined knowledge management (KM) from different aspects. Table 6 provides some typical examples of the definitions of KM. According to Table 6, KM can be described as a systematic process of managing knowledge mainly from searching, creating, organizing, sharing, facilitating and evaluating aspects by utilizing technologies to help in decision making of sustaining competitive advantage. Karadsheh et al. (2009) defined knowledge management as a structured process with activities to capture, discover, create, filter, evaluate, store, share and apply knowledge from individuals to advance business processes and meet organization's objectives and goals. Regarding the definitions of knowledge management, the current study emphasizes that knowledge management is a holistic concept including all the aspects addressed by the definitions mentioned earlier. This point of view describes knowledge management as an intellectual absorb for the information age. Therefore, the literature agrees with what Drucker (1999) proposes, that there is no something called knowledge management as far as there

Table 6. Definitions of knowledge management.

KM definition	Description	Reference
KM Processes	The process of collecting, organizing, classifying and disseminating information throughout an organization, so as to make it purposeful to those who need it.	Albert, 1998
	Defines knowledge management is a process that facilitates knowledge sharing and establishes learning as continuous process within an organization.	Singh, 2008
	a procedure, process or practice to accomplish process about knowledge, process for knowledge, and process from knowledge which leads to improve the internal and external operation	Alryalat and AL-Hawari, 2008
	Knowledge management is a group of clearly defined processes or methods used to search important knowledge among different knowledge management operations.	Liu et al., 2005, 637
	Knowledge management is a systematic approach to managing organizational knowledge and activities include creating, structuring, organizing, retrieving, sharing, and evaluating an enterprise's knowledge assets.	Kim et al., 2008
KM as a strategic perspective	Knowledge management is the strategic application of collective company knowledge and know-how to build profits and market share. Knowledge assets-both ideas or concepts and know-how-are created through the computerized collection, storage, sharing, and linking of corporate knowledge pools. Advanced technologies make it possible to mine the corporate mind.	Zuckerman & Buell, 1998
	(KM) is not really about managing knowledge, but rather managing and creating a corporate culture that facilitates and encourages the sharing, appropriate utilization, and creation of knowledge that enables a corporate strategic competitive advantage.	Walczak, 2005
KM as a technical perspective	It is organized and systemic process for acquiring, organizing and exchanging knowledge among employees in order to effectively utilizing knowledge.	Alavi and Leidner, 2001
	Knowledge management is the new contemporary technological application of knowledge in critical planning, appraisal, decision making, evaluation and redesign of operative systems.	Kibet et al. 2010
KM as a perspective of value-added	It is processes and practices through which organizations generate value from knowledge offers valuable tools for creating, developing, maintaining, and replicating organizational capabilities.	Grant, 2009
	Knowledge management as an entity's systematic and deliberate efforts to expand, cultivates, and applies available knowledge in ways that add value to the entity; in the sense of positive results in accomplishing its objectives or fulfilling its purpose.	Holsapple, 2004
KM as an intangible asset	Knowledge management can be idea of as a deliberate design of processes, tools, structures, with the intent to increase, renew, share or improve the use of knowledge represented in any of the three elements (structural, human, and social) of intellectual capital.	Seeman et al. 1999
	Knowledge management is the practice of harnessing and exploiting intellectual capital in order to gain competitive advantage and customer commitment through efficiency, innovation and effective decision-making.	Yeh, 2005
KM Learning	It is a process of producing knowledge to transport the organization into learning organization.	Parikh, 2001
	(KM) based on knowledge management Learning as a structure based on past experience and build new mechanisms for exchanging and generating new knowledge.	Miltiadis et al. 2002

Table 6. Contd.

Innovation process	KM as a process which contains creation, acquisition, incorporation, allocation, and application of knowledge to advance the operation efficiency and competitive advantage of an organization. Knowledge management presents the right information to the right group at the right time.	Albers and Brewer, 2003
Knowledge architecture	It is a methodical means of administrating this valuable resource, by promoting an incorporated approach to identifying, capturing, structuring, organizing, retrieving, sharing, and evaluating an enterprise's knowledge assets.	Kim et al. 2004
(CRM) Adoption	KM as a methodical leveraging of data, information, proficiency and different structures of assets and resources to enhance organizational innovation, reaction, efficiency and capability.	Goh, 2005

is something called management of persons who have knowledge.

What can knowledge management do for SCA?

The first task that knowledge management can do for SCA is to transform or create knowledge from tacit to explicit and from individual to organizational. Gao et al. (2008) classified knowledge into individual knowledge and organizational Knowledge. Individual knowledge refers to Drucker's specialized knowledge and Polanyi's tacit knowledge as well as the person's values – professional ethics and morals. Personal knowledge belongs to the person who possesses it rather than the organization s/he works for, but it can be used by the organization. Organizational knowledge is divided into organizational static substance knowledge and organizational dynamic process knowledge. Static substance knowledge refers to explicit knowledge or the bodies of knowledge in terms of mission and vision, science, technology, management theory, as well as the information and data upon which knowledge is based or from which it is drawn out. Organizational dynamic process knowledge relates to human actions or the activities of organizational operation, called the organizational human activity system. In this sense, the transition process from tacit to explicit is also the transition process from individual knowledge to organizational knowledge.

Nonaka et al. (2000) developed the spiral model of knowledge: new knowledge always begins with the individual, for instance, a brilliant researcher has an insight that leads to a new patent. In each case, an individual's personal knowledge is transformed into organizational knowledge, which expands through the organization and is valuable to the organization as a whole. Making personal knowledge available to others should be the central activity of the knowledge and innovation creating organization. It occurs continuously and at all levels of the organization. Through these interactions, an organization creates a knowledge process, called knowledge conversion. According to Nonaka et al. (2000), there are four modes of knowledge conversion. The SECI process

is illustrated in Figure 9 (Alwis and Hartmann, 2008; Abdullah et al., 2009).

Socialization from tacit to tacit knowledge is a process of sharing experiences and thereby creating tacit knowledge such as shared mental models and technical skills. Externalization from tacit to explicit knowledge is a process of articulating tacit knowledge into explicit concepts. It is a quintessential knowledge-creation process in that tacit knowledge becomes explicit, taking the shapes of metaphors analogies, concepts, hypotheses, or models. Combination from explicit to explicit knowledge is a process of systemizing concepts into a knowledge system. This mode of knowledge conversion involves combining different bodies of explicit knowledge. Individuals exchange and combine knowledge through such media as documents, meeting, telephone conversation, or computerized communication networks. Reconfiguration of existing information through sorting, adding, combining, and categorizing of explicit knowledge (as conducted in computer databases) can lead to new knowledge. Internalization from explicit to tacit knowledge is a process of embodying explicit knowledge into tacit knowledge. It is closely related to "learning by practice" when experiences are internalized into individuals' tacit knowledge bases through socialization, externalization, and combination in the form of shared mental models or technical know-how, they become valuable assists. Thus, from these four conversion modes, new knowledge is created as the source of sustaining competitive advantage.

The second task that knowledge management can do for SCA is to keep knowledge updated as knowledge is alive and has its own life cycle. Figure 10 describes the life cycle of knowledge areas where they rise, mature and decline according to their distinct strategic importance to the organization. According to Figure 4, the different knowledge areas can be distinguished in the following way:

1) Promising knowledge areas are the infancy stages of knowledge which has demonstrated the potential to radically change the execution of one or more of an organization's tasks.

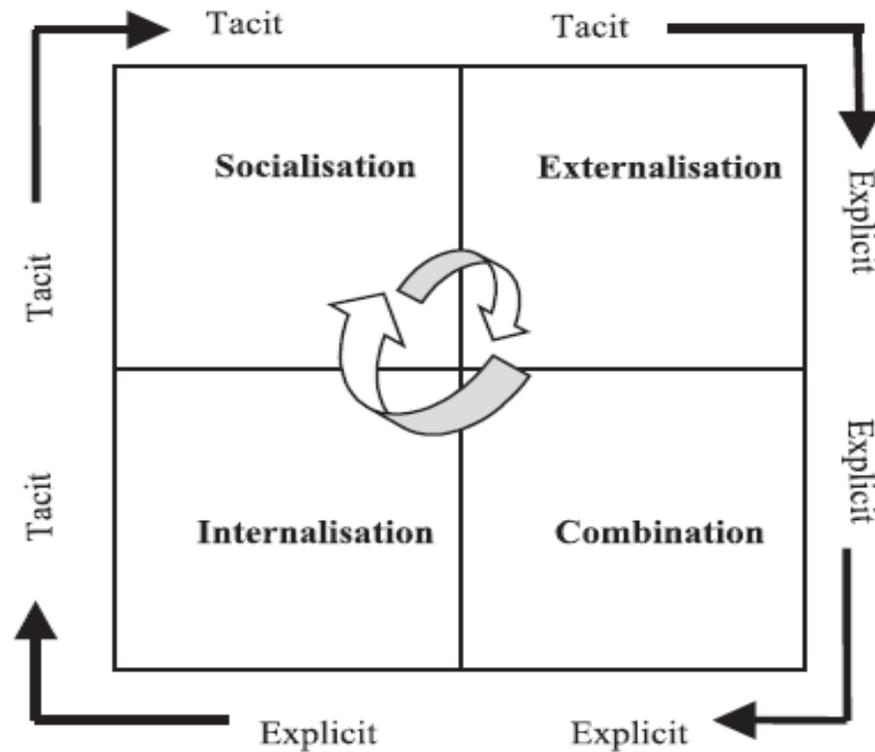


Figure 9. The SECI process (Source: Alwis et al., 2008).

- 2) Key or core knowledge areas distinguish the organization from other companies. They have the greatest influence on the unique position of the organization
- 3) Basic knowledge areas are essential for carrying out an organization's activities. This knowledge is widely available in all similar organizations.
- 4) Outdated knowledge areas are no longer or rarely applied in business processes.

As knowledge moves from promising (infancy), to key (growth), to basic (mature) until outdated, the knowledge management could function accordingly to different stages. To obtain promising knowledge, knowledge management can assist in acquiring knowledge that is already in the company, or protect from the loss of knowledge due to employee's departure, or adapt internal or external knowledge to be utilized in new ways. To stimulate key knowledge, knowledge management can realize the identification of useful knowledge for different business operation, or systematically arrange knowledge for different business operations, or develop knowledge through experts reviewing the content or online communication to determine which knowledge to cultivate further. To distribute basic knowledge and refresh outdated knowledge, knowledge management can provide easy accessibility of the knowledge that is in need, frequent updating of knowledge storage and safe maintenance of knowledge management. Thus, knowledge management plays a channel role that transits sources of SCA to be

media of SCA.

Achieving SCA through knowledge and knowledge management

After identifying the roles of knowledge and knowledge management in sustaining competitive advantage as core source and transition channel between source and media respectively, the process of achieving SCA through knowledge and knowledge management is as illustrated in Figure 11. From Figure 11, it can be seen that resources and skills as source of SCA are specified into knowledge as well as wisdom. Knowledge can be either individual or organizational. Both individual and organizational knowledge can be upgraded into wisdom in forms of three levels including core knowledge, advanced knowledge and innovative knowledge. These three levels of knowledge, together called strategic knowledge, comprise the major source of SCA. By integrating knowledge management, the movement of data and information is also the process of knowledge collection. The transition from data and information into knowledge as well as wisdom is subject to the process of knowledge creation. And to extract core knowledge, advanced knowledge and innovative knowledge from wisdom into strategic knowledge can be facilitated from the process of knowledge development and knowledge distribution. Holistically, the flow of knowledge in various forms combined with the

Contribution to core processes Growth potential of the market	High contribution	Low contribution
High growth	Key knowledge areas	Promising knowledge areas
Low growth	Basic knowledge areas	Outdated knowledge areas

Figure 10. Knowledge life cycle.

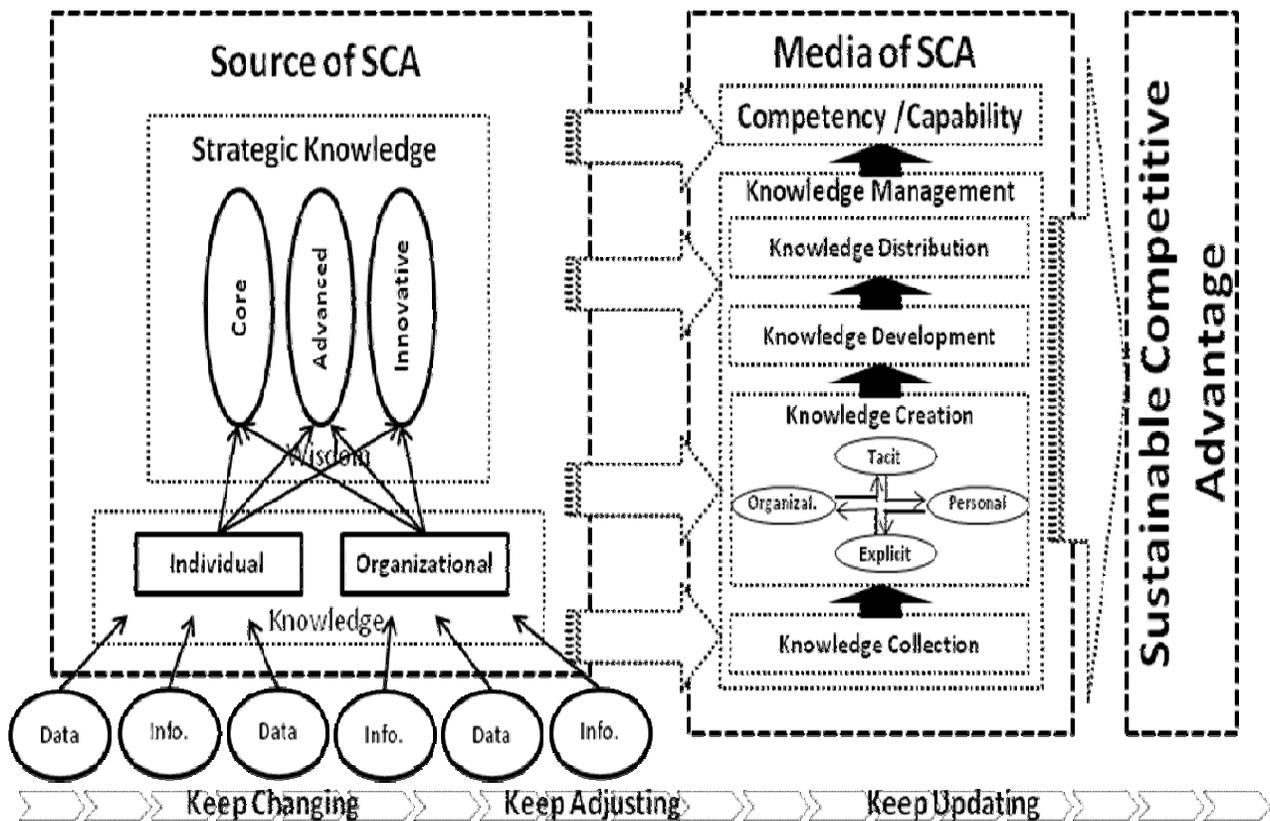


Figure 11. Process of achieving SCA through knowledge and KM.

processing of knowledge management complete the leap from source of SCA into the media of SCA which is then presented in different forms of the objectives of SCA. But to keep these competitive advantages for a long time, the whole process needs to be frequently changed, adjusted and updated in order to meet the endless changing

challenges.

CONCLUSION

This study, after comparing previous researches,

summarized two main issues that always bother the scholars and practitioners in their efforts of sustaining competitive advantages: 1) which resources or skills can be identified as the source of SCA? 2) How can one transform the identified source into the capability or competency of the organization?

Since the source of SCA should be convertible, inimitable and valuable, knowledge is proposed as similarly as other researchers to be resource and skills of SCA. But more deeply, by reviewing researches about knowledge, the study explored knowledge into more specific scope as strategic knowledge which contains three different levels of core, advanced and innovative knowledge. In this way, it specified to some extent the strategic idea of SCA to be more feasible. Then, after reviewing researches about knowledge management, the study adding tactical analysis from knowledge management perspective, managed to answer the second question mentioned through the major four processes of KM including knowledge collection, creation, development and distribution. Finally, by holistically and dynamically integrating the two systems, the expected sustainable competitive advantage is supposed to be achieved.

To conclude, this study provided a mechanism that knowledge and knowledge management could potentially impact the process of sustaining competitive advantage but only from a theoretical point of view. Thus, to support it in an empirical way is one direction for our future work.

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