Implementing successful knowledge management system: Critical success factors

ABSTRACT

Knowledge has become one of the critical driving factors for business success. Organizations are becoming more knowledge intensive, they are hiring "minds" more than hands, and the needs for leveraging the value of knowledge are increasing. As a result, knowledge has been treated systematically much like other tangible resources and many organizations are exploring the field of knowledge management in order to improve and sustain their competitiveness. The need for a more systematic and deliberate study on the critical success factors (CSFs) for implementing knowledge management is crucial. Organizations need to be cognizant and aware of the factors that will influence the success of a knowledge management initiative. Ignorance and oversight of the necessary important factors will likely hinder an organization's effort to realize its full benefit. This paper compares and reviews the existing CSFs proposed by various authors in the literature. An analysis is conducted to identify their possible weaknesses and deficiencies, which could be further improved. By combining these factors a set of CSFs for knowledge management implementation is proposed. Each of the proposed CSFs is discussed and the results of an empirical assessment employed to evaluate them are then reported.

KEYWORDS:

Knowledge management system (KMS), Critical success factors, CSFs, Knowledge management.

1- INTRODUCTION

Knowledge management (KM) is the key that created business special assets in the global knowledge-based economy [9]. Recent years have seen increased attention being given to the implementation of knowledge management systems (KMSs) in business. KM has been particularly influential in contributing insights into how businesses manage their knowledge. With this increasing usage, KM requirements for business implementation have become more critical. Liebowitz (1999) has noted that implementing and managing knowledge are critical to enabling organizational performance enhancements, problem solving, decision making, and teaching [6]. Also, effectively managed knowledge brought to maximize an enterprise's knowledge-related effectiveness and returns will form its knowledge assets (Towe, Pizziconi, & Wiig, 1997). Businesses successfully implementing KMSs may create business value; this also enhances growth, market competition, innovation and improvement (Liebowitz, 1999) [6]. In today's business environment to give way to knowledge and experience can easily be shared and sustain competition. Successful adoption of KMSs not only explode and accelerate the pace of new information and subsequent knowledge but also create new knowledge for raising business core competition to help managers effectively solve the enterprise's problem (Bixler, 2005) [1]. Implementing KMSs in the enterprise can effectively solve enterprise problems, which can enhance continuous improvement and innovation. As this review has shown, most research on KMSs implementation has focused on assessing KMSs success in high-tech industries or the

pharmaceutical industry (Chen, Yang, Lin, Yeh, & Lin, 2007; Hung, Huang, Lin, & Tsai, 2005; Ong & Lai, 2007; Rogers, 2001) [16]; additional research used multi-case analysis to find critical success factors (Peyman et al., 2006). Although substantial studies have been performed on the key drivers that affect the implementation of KMSs success, investigation of those drivers' main concerns is still critically lacking. Key drivers have been identified and recognized as fundamental for organization success and better performance in several activity domains. Knowledge management drivers are the mechanism for the organization to develop its knowledge and also stimulate the creation of knowledge within the organization as well as the sharing and protection of it. They are also the necessary building blocks in the improvement of the effectiveness of activities for knowledge management (Ichijo et al., 1998; Stonehouse and Pemberton, 1999) [3].The concept of key drivers was first defined by Rochart, who identified key drivers as the limited number of identified operational goals shaped by the industry, the firm, the manager, and the broader environment that, if satisfactory, will ensure successful competitive advantage for the organization. It is clear from this definition that drivers provide management with the ability to focus attention on the major activities that need to be performed effectively in order for the business to be successful. The paper begins with a general overview of the knowledge management and important factors for adopting KM [12]. The next section presents the findings of the survey as well as the results of various statistical analyses and

tests that were applied. An interpretation and discussion of the overall results gained from the study follows.

2- REVIEW OF KEY DRIVERS FOR KM IMPLEMENTATION

How can the success of KMSs implementation be measured? In order to deal with measuring the implementation of KMSs successfully, thereby providing enterprise competition, managers should identify potential key drivers leading to effective implementation [4]. A broad range of drivers that can influence the success of KM implementation has been mentioned in the literature. For example, much has been stated about culture, information technology (IT) and leadership as important considerations for its accomplishment [13]. Drivers can be defined as "areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation" (Rockart, 1979). Saraph et al. (1989) viewed them as those critical areas of managerial planning and action that must be practised in order to achieve effectiveness [2]. In terms of KM, they can be viewed as those activities and practices that should be addressed in order to ensure its successful implementation. These practices would either need to be nurtured if they already existed or be developed if they were still not in place. Based on the above definition, driverss in this study are treated as those internal factors which are controllable by an organisation. External factors such as environmental influences are not taken into account since organisations have little control over them when implementing KM. Some of the pertinent studies on drivers for KM will now be reviewed and their possible weaknesses highlighted. Based on the insights gleaned from the study of practices and experiences of leading companies in the KM field, Skyrme and Amidon (1997) highlighted seven key success drivers [3]. These include a strong link to a business imperative, a compelling vision and architecture, knowledge leadership, a knowledge creating and sharing culture, continuous learning, a well-developed technology infrastructure and systematic organisational knowledge processes. It was stated that not all of these factors would be important for small scale pilot projects. However, they would certainly need to be considered for those organisations that were formalising KM or transforming themselves into true knowledge-based enterprises. A study to investigate the drivers which can influence the management of knowledge in organisations was carried out by Holsapple and Joshi (2000) [2]. First, they derived a set of drivers from various literature sources. Then, they conducted a Delphi study, comprising an international panel of KM academics and practitioners to further explore and evaluate the drivers that they had developed earlier. They proposed three major classes of influences (managerial, resource and environmental),

with different factors in each. Managerial influences comprised four main factors, coordination, control, measurement and leadership; resource influences consisted of knowledge, human, material and financial resources; whereas environmental influences included factors such as competition, markets, time pressure, governmental and economic climates, etc. From the evaluation of their Delphi study (final round), it was reported that there was a lack of detailed inclusion of technology and culture as critical factors. For example, culture was not explicitly presented but was only included as a sub-concept under the knowledge resource factor. This representation is somewhat insignificant. Culture is a very important consideration for KM and it should be represented as a driver, rather than as a sub-element of another. Certain drivers were also perceived to be missing such as knowledge infrastructure, communication, training, education, organizational planning, strategy setting, and reward issues. In addition, it was argued by one of the panels that the process of implementing KM would entail the need for sponsorship, support and understanding, not merely leadership as proposed by them. Nevertheless, all these concerns should be considered in an effort to further develop and refine the key drivers. Davenport et al. (1998) conducted an exploratory study on 31 KM projects in 24companies, one of the aims being to determine the drivers associated with their effectiveness [7]. Before doing so, they evaluated the performance of the projects using indicators analogous to those for assessing the success of other business change initiatives. As a result, 18 projects were classified as successful, from which eight common success drivers were identified. They were linking KM to economic performance or industry value, a clear purpose and language, a standard and flexible knowledge structure, multiple channels for knowledge transfer, a knowledge-friendly culture, a technical and organisational infrastructure, change in motivational practices, and senior management support. It was further stated that while the last four drivers were the hardest to develop, they were also the ones that mattered most. However, since this was an exploratory study, it was agreed by Davenport et al. (1998) that linking the identified drivers to the success of KM should be viewed as hypothesised, not proven. Chourides et al. (2003) identified various key drivers for successful KM implementation in five organisational functional areas: strategy, human resource management (HRM), IT, quality and marketing. Their work was built upon an earlier questionnaire survey of the financial times stock exchange (FTSE) 100 companies as well as a review of existing literature to identify key practices and drivers for adopting KM. Subsequently, they conducted a longitudinal study in eight case organisations, which were at various stages of implementing KM programmes to further compare and assess their drivers. In particular, interviews with key staff of these organisations were conducted for this purpose. The way in which their key

drivers are presented are like "a list of things to do" rather than a set of drivers as suggested by other authors such as Skyrme and Amidon (1997) and Davenport et al. (1998). An in-depth scrutiny of their key drivers unveil some emerging concerns and issues. The author feels that some of their drivers are too specific which might be hard to generalise across organisations. For example, they suggested monitoring the "KM people portfolio matrix" as a key driver for KM in the HRM area. This matrix is merely one of the many techniques that can be utilised to facilitate the conduct of a people audit. Arguably, organisations can also employ other alternatives to monitor their people in order to be successful in KM. Besides this, certain key drivers such as "improve time to market skills" and "improve organisation velocity to respond to customer needs" are less appropriate. It can be argued that these are the things that organisations should do to improve their efficiency and customer satisfaction. They can be interpreted as the objectives or purposes of KM, not those that are vital for making KM a success. Clearly, they are not in line with the definition of key drivers as provided earlier in the paper. Liebowitz (1999) proposed six key ingredients in order to make KM successful in organisations. He suggested the need for a KM strategy with support from senior leadership, a chief knowledge officer (CKO) or equivalent and a KM infrastructure, knowledge ontologies and repositories, KM systems and tools, incentives to encourage knowledge sharing and a supportive culture. Specifically, important lessons learnt from firms who were early adopters of KM were used to support his propositions. In the first ingredient, he advocated the creation of a centre of expertise for every knowledge discipline or subject matter, as a KM strategy which could be undertaken by organisations. The resource requirement for such an activity could be tremendous and this reflects a focus towards those organisations that have the necessary expertise, human and financial resources. According to Hasanali (2002), the success of a KM effort depends on many drivers. He highlighted five categories of drivers namely leadership, culture, structure, roles and responsibilities, IT infrastructures, and measurement. Likewise, the APQC (1999) included strategy and leadership, culture, technology and measurement in their framework as enablers which can support the operation of KM. Although these drivers are eminently sensible, it is believed that the success of KM is dependent on more aspects. A comprehensive set of drivers is needed to give a more complete view of those that are necessary. Table I provides a comparative summary of some of the main issues of these studies. As is evident, Different sets of key drivers have been put forward by different authors. According to these drivers we propose a set of 8 drivers and a measurement model according to them.

- Leadership
- Culture
- Information Technology
- Measurement
- Training and Education
- HRM
- Strategy
- Benchmarking

3- Method and Data collection

The method employed in this study for gathering empirical data was a postal survey. This was selected for the following reasons (Chauvel and Despres, 2002):

- a survey brings an issue into focus by defining and specifying its various elements;
- its results are typically quantifiable, and thus amenable to statistical analysis;
- statistical treatment allows the results obtained from a sample to be extended to a larger population, thus enabling the generation of more global statements; and

it is faster and more direct compared to many other research methods.

A questionnaire was developed which has 2 main parts. The first explored general issues and characteristics of the participants, such as the age, gender, education. The second part investigated the 8 CSFs and their elements that were derived from the literature. Respondents were asked to rate the level of importance they placed on each element using a six-point Likert scale (1 ¼ not important at all, 2 ¼ slightly important, 3 ¼ moderately important, 4 ¼ important, 5 ¼ very important, 6 ¼ extremely important). To enable respondents who did not know or were unsure of how to answer, an additional scale of ''0'' was also provided. A Likert scale with a midpoint tends to undermine extreme positions (Albaum, 1997). Moreover, respondents are generally reluctant to express a radical view even if they have one, and all too often, they tend to take a reasonable route by offering a ''socially acceptable answer'' (Lee and Choi, 2003). The use of a 6-point scale helps to alleviate this bias by avoiding a midpoint, thus preventing the occurrence of the central tendency error (Gotzamani and Tsiotras, 2001). A question was also included to ask the participants to rank a set of statements – one for each of the 8 CSFs, from 1 to 8 (1 ¼ the most important, 11 ¼ the least important) in order to prioritise their importance.

3-1- LEADERSHIP AND SENIOR MANAGEMENT COMMITMENT

Management leadership plays a key role in influencing the success of KM(Horak, 2001; Pan and Scarbrough, 1998; Holsapple and Joshi, 2000; Ribiere and Sitar, 2003). Leaders are important in acting as role models to exemplify the desired behaviour for KM. They should for example, exhibit a willingness to share and offer their knowledge freely with others in the organization, to continuously learn, and to search for new knowledge and

ideas. It is vital that they model their behaviours and actions through deeds, not just words. By doing so, they can further influence other employees to imitate them and increase the propensity of employees to participate in KM. Other leadership competencies that would be important include steering the change effort, conveying the importance of KM to employees, maintaining their morale, and creating a culture that promotes knowledge sharing and creation. In essence, leaders establish the necessary conditions for effective KM (Holsapple and Joshi, 2000) [5,2]. Another most important aspects of KM implementation is organizational constrains. Organizational constrains can impede perception and/or attitudes necessary for KM success (Bonaventura, 1997; Demarest, 1997). As with all change and improvement programmes, support and commitment from senior management is critical to a KM initiative (Martensson, 2000; Manasco, 1996; Truch, 2001; Jarrar, 2002; Sharp, 2003; Davenport et al., 1998). Storey and Barnett (2000) added that support from top management should be ongoing and be delivered in a practical manner. Such support could then be transformed into concerted efforts that would contribute to the success of KM [11].

3-2- CULTURE

Organisational culture is another imperative driver for successful KM (Davenport et al.1998; Pan and Scarbrough, 1998; Martensson, 2000) [1, 10]. It defines the core beliefs, values, norms and social customs that govern the way individuals act and behave in an organisation. In general, a culture supportive of KM is one that highly values knowledge and encourages its creation, sharing and application. The biggest challenge for most KM efforts actually lies in developing such a culture. A survey result reported by Chase (1997) affirmed that culture was the largest obstacle faced by organizations in creating a successful knowledge-based enterprise. Since culture is a wide concept, it comprises many facets. One cultural aspect which is crucial for KM is collaboration. Goh (2002) asserted that a collaborative culture is an important condition for knowledge transfer to happen between individuals and groups. This is because knowledge transfer requires individuals to come together to interact, exchange ideas and share knowledge with one another. Not only this, collaboration has been empirically shown to be a significant contributor to knowledge creation (Lee and Choi, 2003). Trust is also another fundamental aspect of a knowledge friendly culture (Stonehouse and Pemberton, 1999; DeTienne and Jackson, 2001; Lee and Choi, 2003). Without a high degree of mutual trust, people will be sceptical about the intentions and behaviours of others and thus, they will likely withhold their knowledge [19]. As Buckman (1999) pointed out, creating and sharing knowledge are intangible activities that cannot be forced. Only when a culture of trust and openness is formed and felt by

organizational members, KM can give birth to core competencies. So building a relationship of trust between individuals and groups will help to facilitate a more proactive and open knowledge sharing process. Besides this, there is a need to foster an innovative culture in which individuals are constantly encouraged to generate new ideas, knowledge and solutions. Likewise, Goh (2002) suggested a culture which emphasises problem seeking and solving. Individuals should also be permitted to query existing practice and to take actions through empowerment (Stonehouse and Pemberton, 1999). By empowering individuals, they will have more freedom and opportunities to explore new possibilities and approaches. Equally important is the element of openness whereby mistakes are openly shared without the fear of punishment. In this respect, reasonable mistakes and failures are not only tolerated but allowed and forgiven. Making mistakes should be viewed as an investment process in individuals because it can be a key source of learning. Owing to the highly influential nature of a culture to the success of KM, Davenport et al. (1998) asserted that companies should ensure that their KM initiatives fit into their organizational culture, or else they should be prepared to change it [8]. The importance of matching a KM initiative with the culture, style and core value of an organization was also highlighted by McDermott and O'Dell (2001).

3-3- INFORMATION TECHNOLOGY

The emphasis on implementing IT artefacts for knowledge creation and sharing has several implications for potential success drivers. Gray and Durcikova (2006) report, for example, that "[a] key limitation on the potential effectiveness of any IT-based system is its ease of use…it follows that one reason why analysts may not source knowledge from a repository is that the technology is not sufficiently easy to use—that is, it may be awkward, slow, or difficult enough to use that analysts may believe that the benefits do not outweigh the costs" (p. 184) [17]. Accordingly, Damodaran and Olphert (2000) found that speed and response times of the system are crucial to system success. Thus, KM tools must seamlessly integrate into the day-to-day routine and activities of employees; if it is difficult to use and takes them away from their core activities, they will not see the advantages of using the system (Alavi & Leidner, 1999). Stenmark (2002) argues that Web-based intranets offer an excellent IT platform for knowledge sharing. Lam and Chua's (2005) empirical findings provide support for this perspective, as do Butler et al. (2006) who illustrate that Web-based technologies form the key components of a core IT artefact for knowledge sharing. IT can enable rapid search, access and retrieval of information, and can support collaboration and communication between organisational members [1]. In essence, it can certainly

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play a variety of roles to support an organisation's KM processes (Alavi and Leidner, 2001; Lee and Hong, 2002). However, it is noteworthy to recognise that IT is only a tool not an ultimate solution (Wong and Aspinwall, 2003). Important factors that need to be considered in the development of a KM system include simplicity of technology, ease of use, suitability to users' needs, relevancy of knowledge content, and standardisation of a knowledge structure or ontology. On the other hand, Gold et al. (2001) argue that trust and openness are at the core of knowledge sharing behaviours; however, as knowledge is a valuable firm-specific resource, security is also an important consideration (Alavi & Leidner, 1999; Jennex & Olfman, 2006) [4]. In this context, security is viewed as being a technological issue, while openness associated with interpersonal or cultural dimensions (Gold et al., 2001). In their action research study on KMS design, however, Butler et al. (2006) clearly focus on "openness" over security when it comes to developing IT artefacts for knowledge sharing. Indeed, security is low in the hierarchy of success drivers, 12th in fact, for KMS, as reported by Jennex and Olfman (2006). Thus in designing a KMS, the issues of security need to be balanced with openness in KMS design and use [1]. The IT/IS function in an organization plays a key supporting role in KMS design, development, and implementation (Davenport & Prusak, 1998): However, the development of such an infrastructure should be businessoriented, as researchers maintain that the development of the KMS should be user-driven and based on the business objectives of an organisation (Damodaran & Olphert, 2000; Mason & Pauleen, 2003). For example, Lam and Chua (2005) report that one KMS project failed due to a dearth of technical and business knowledge required to sustain the program, the implication here is that it would have been a success had there been a high level of IT and user/business participation throughout [16].

3-4- MEASUREMENT

Measurement acts like a data collection system that gives useful information about a particular situation or activity. An initiative like KM will suffer the risk of becoming just another management fad, if it is left unmeasured. Sayings like "you cannot manage what you cannot measure" and "what is measured is what gets done" certainly hold true for KM [4]. According to Arora (2002) and Ahmed et al. (1999), measuring KM is necessary in order to ensure that its envisioned objectives are being attained. Measurement enables organisations to track the progress of KM and to determine its benefits and effectiveness. Essentially, it provides a basis for organisations to evaluate, compare, control and improve upon the performance of KM (Ahmed et al., 1999). Measurement is also needed to demonstrate the value and worthiness of a KM initiative to management and stakeholders. Without

such evidence, support and confidence from top management to sustain it will diminish. Since it is difficult, if not impossible to quantify the benefits of KM in the short term, providing narrative indicators to reflect its success at its early stage is important. Another key aspect of measurement is to evaluate the impact that KM has on bottom line financial results. However, linking KM activities directly to financial results can be tough, since many intertwining variables can affect the financial performance of a company at the same time. While it is important to correlate them, care must be taken not to claim a pure causal relationship (Hasanali, 2002) [17]. It is important that traditional hard measures are supplemented by soft, nonfinancial measures in order to provide a more holistic approach to measuring KM (Ahmed et al., 1999). Thus regardless of the type of knowledge (tacit or explicit) its contribution must be measureable not only by traditional financial measures but also by other performance measurements. Knowledge must be measured because an organization's intellectual capital includes the brains of its employee, their know-how, the process and customer knowledge that they create. Thus, it is clearly necessary to include the performance measurement system as a key driver for the successful KM implementation (Bassi and Van Buren, 1999; Barsky, 2000; Bukowitz and Petrash, 1997; Martinez, 1998; Pearson, 1999). Some of the methods being used include intellectual capital metrics (Sveiby, 1997; Liebowitz and Suen, 2000; Bontis, 2001) and the balanced scorecard (Kaplan and Norton, 1992; Arora, 2002). Nevertheless, there is still no absolute method for measuring KM in an organisation (Gupta et al., 2000), and this is an area which is still being explored by academics and practitioners (de Gooijer, 2000).

3-5- TRAINING AND EDUCATION

Training and education is another important consideration for successful KM. In a basic sense, organizational members need to be aware of the needs to manage knowledge and to recognize it as a key resource for the viability of a company. This issue can be addressed if proper basic training is provided to the employees. Through such training, they will have a better understanding of the concept of KM. It also helps to frame a common language and perception of how they define and think about knowledge. Besides this, employees could be trained and educated in using the KM system and other technological tools for managing knowledge. This helps to ensure that they can utilize the full potential and capabilities offered by these tools. In addition, training for individuals to understand their new roles for performing knowledge-oriented tasks might be needed. Equally important is to equip them with the skills to foster creativity, innovation, and knowledge sharing. Horak (2001) suggested that for effective KM, skills development should occur in the following areas: communication, soft networking, peer learning, team

building, collaboration and creative thinking. Likewise, Yahya and Goh (2002) showed that training related to creativity, team building, documentation skills and problem solving had a positive impact on the overall KM process.

3-6- Human resource management

Certainly, KM practitioners cannot afford to ignore the value that can be gained from HRM. After all, people are the sole originators of knowledge. As stated by Davenport and Volpel (2001), "managing knowledge is managing people; managing people is managing knowledge". The significance and roles of HRM in KM have been discussed by a number of authors (e.g. Soliman and Spooner, 2000; Garavan et al., 2000; Brelade and Harman, 2000; Robertson and Hammersley, 2000). While it is vital to KM for many reasons, the main focus here is on the issues of employee recruitment, development and retention. Effective recruitment of employees is crucial because it is through this process that knowledge and competences are brought into the organization. Employees with the required knowledge and desired skills to fill knowledge gaps should be recruited. Furthermore, it is essential that companies enlist those who have the tendency and inclination for creating and sharing knowledge. Additionally, Robertson and Hammersley (2000) highlighted the significance of recruitment to focus on the ability of candidates to fit into the firm's culture or distinctive way of working rather than just matching them to a job specification. Employee development is seen as a way to improve and enhance the personal value of individuals. The skills and competences of knowledge workers need to be continuously developed in order for them to produce valuable contributions to a company. If not, as with other tangible assets, their value will depreciate. Hence, companies have to provide appropriate professional development activities to their employees. Another central issue in KM is how to retain knowledge from being lost. This is where the function of employee retention gains its significance in KM. In order to retain employees to work for a company, it is important to provide opportunities for them to grow and to advance their career. HR policies and practices need to be designed to allow them to meet their personal aspirations (Brelade and Harman, 2000). Equally important is to offer a conducive working environment in which employees feel comfortable and to foster job satisfaction among them [14].

3-7- Strategy

A knowledge management strategy is crucial to the success of a knowledge management program (Ernst & Young, 1999; Kavindri, 2005; KPMG Consulting, 2000; Parlby and Taylor, 2000; Robertson, 2005b; Yu, 1999). The literature indicates that it should address a variety of issues. Firstly, the creation of understanding of

the organization's knowledge resources should be addressed. Assessing knowledge resources leads to shaping of a knowledge agenda to achieve sustainable results in alignment with the business strategy. The agenda determines how the organization must leverage the knowledge to achieve breakthrough results. Agenda goals may include creating innovative customer experiences, or developing new business models through knowledge exchange with business partners and customers. A knowledge agenda is critical to achieve desired outcomes, mobilizing the organization and establishing critical performance measures (Yu, 1999). Ernst & Young (1999) agrees that it is essential to create a blueprint of knowledge within the organization to enable understanding how knowledge can enhance and enable specific processes in the organization. Secondly, the knowledge management strategy needs to articulate the role that knowledge will play in value creation. The vision also needs to consider resource availability as these conditions the implementation approach (Havens and Knapp, 1999). Thirdly, the strategy should comprise of a number of integrated projects, phased in over time, including quick wins as well as long-term benefits (Parlby and Taylor, 2000). The knowledge management strategy should link to business objectives and encompass a vision of short term and long-term initiatives and benefits. Also knowledge management strategy is executed as a process, not a project. Finally, the knowledge management strategy should indicate the risks associated with a knowledge management program and identify key organizational needs and issues and provide a framework for addressing these (Robertson, 2004). Also it is critical that the knowledge management strategy should be tied to the business strategy. Knowledge management should never be implemented as an end in itself (Chait, 1999; Donaghue et al., 1999; Parlby and Taylor, 2000; PriceWaterhouseCoopers, 1999a, p. 7; Stadler and Stone, 2001). ''KM programs succeed when knowledge capital is employed to accomplish specific business strategies. We know of no successful KM programs not tied to a specific business strategy or goal'' (PriceWaterhouseCoopers, 1999a, p. 7). Chait (1999) indicates the importance of this linkage by indicating that in many ways, managing knowledge is no different from managing other aspects of an organization: firstly, there must be a vision that links with the organization's objectives and strategies, second, people must be aligned with that vision, and third, the alignment must be from the top down and all across the organization. Donaghue et al. (1999) and Mullin (1996) indicate that it is critical for a knowledge management program to be based on an organization's processes and activities to ensure that knowledge is optimized to build the critical capabilities of the organization. The author agrees, as tying the knowledge management program to an organization's business processes will ensure that the program is oriented towards achieving efficiency

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improvements within core and enabling processes through more effective and efficient use of knowledge, thus assisting in achieving the objectives of the business strategy. Business processes are tied to the organization's business strategy, making them a logical starting point for a knowledge management strategy and program and thus ensuring that the knowledge management strategy supports the business strategy and does not exist in isolation [6].

3-8- Benchmarking

Benchmarking is a very well-known management tool. It can be defined as the process of the developing and realizing improvement objectives and measuring of organizational performance against that of a leading organization. Benchmarking determines how the leading organization achieves those performance levels and uses the information as a basis for the organization's targets, strategies and implementation (Karlof and Ostblom, 1993). "The purpose of benchmarking is to identify performance gaps and potential areas of improvement at the strategic or business process levels. Based on the significance of such gaps for competitive success, the management of a company can initiate properly targeted efforts for improvements in performance indicators, (i.e., quality, cost,delivery time, or customer service and satisfaction) that impact its competitive advantage" (Kostas, 2000). Drew (1997) has identified the following benefits and drawbacks of benchmarking: (1) benchmarking can be most effective when integrated with other systems such as strategic planning, budgeting, and human resource management; (2) an organization must not count on general impressions or anecdotes about competitors; (3) employee must also be educated in benchmarking best-practices; and (4) organizations that have thoroughly prepared and aligned their approach to strategic position, competencies, and market objectives accure the greatest benefits from benchmarking. Since managing knowledge work effectively is becoming a necessary for functional area heads and department managers, there are several methods can be utilized. Once an organization has benchmarking best practices, it is easier to apply the useful knowledge around the organization (Davis, 1996). Day and Wendler's (1998) study provides practical implications for a wider view of KM benchmarking. They insisted that it is necessary to develop knowledge strategy in order to capture, share, and manage organizational knowledge correctly, and one of the knowledge strategies would be benchmarking. They described McDonald's benchmarking development process as a knowledge strategy. O'Dell and Grayson (1997) insisted that internal benchmarking can be an effective means to improvement. However, internal benchmarking must take into account ignorance, a culture that values team efforts less than personal expertise, and lack of resources [1].

4- Sample characteristic and profile

Tamin Management Consultancy & Computer Services Co. INC is a Subsidiary of Social Security Organization of IRAN (SSO.IR) and was found in 1992. The company's initial mission was to design and implement SSOI comprehensive office automation plan. Doing the above said task in the last 15 years brought us a valuable experience in the field of ICT. Also it has a vision to Design, produce and offer required software system immediately toward e-society and e-social security realization via promoter and effective presence in national and international arenas. A total of 26 questionnaires returned out of 40 which cause acceptable response rate of 65 per cent.

5- Validation of CSFs

Validating and refining the CSFs is important before any further analysis is conducted. To this end, reliability and validity tests were carried out following the sequence and approach taken by Saraph et al. (1989), Yusof and Aspinwall (2000) and Antony et al. (2002). Reliability of a scale (factor or construct) is to examine its internal consistency by calculating Cronbach's alpha. This method indicates the extent to which items (elements) within a scale are homogenous or correlated (Saraph et al., 1989; Badri et al., 1995). It is also reflective of the consistency between different items in a scale, in measuring the same attribute. Generally, alpha values greater than 0.7 are regarded as sufficient (Nunnally, 1994; Cuieford, 1965), although a cut-off value of 0.6 was used by researchers such as Black and Porter (1996), Rungasamy et al. (2002) and Antony et al. (2002).

Involvement	Frequency	Per cent
Writing articles for periodicals	18	100.0
Presenting papers at conferences	16	88.9
Giving lectures on related topics	15	83.3
Providing consulting services	13	72.2
Conducting research	12	66.7
Writing books	12	66.7
Others	4	22.2

Table(1): Profile of Contributors: Contribute to KM

Table 2 summarises the results of the reliability analysis for each factor. As can be seen, the original alpha values for the factors ranged from 0.7113 to 0.8889. Despite this, certain items were deleted from the factors to further improve their internal consistency. For example, the deletion of item 2.5, ''encouraging teamwork among employees'' from the culture factor, increased its alpha level to 0.8687. The final alpha values after discarding the appropriate items, ranged from 0.7113 to 0.9047. This provides evidence that all the factors have high internal consistency, and are thus reliable. An instrument has content validity if it has measurement items that adequately cover the content domains or aspects of the

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concept being measured (Ahire et al., 1996). It is not assessed numerically, but can only be subjectively judged by the researchers (Saraph et al., 1989; Gotzamani and Tsiotras, 2001). The survey instrument used in this study was the outcome of an iterative process of checking and refinement. The basic factors as well as their elements were derived from a comprehensive and extensive review of the relevant literature, as discussed earlier. In addition, many of them were generic factors and followed closely those developed by leading researchers in KM, such as Davenport et al. (1998) and Liebowitz (1999). Hence, it is believed that each factor as well as the instrument as a whole have valid contents. Criterion or predictive validity refers to the degree to which an instrument can successfully predict an independent relevant criterion that is related to the phenomenon being measured. Since this instrument is measuring the importance of a set of factors for effectively adopting KM, it is certainly related to the success of a company's KM effort. In other words, successful KM should stem from the attention or importance placed on the necessary factors. Finally, each factor was individually tested for construct validity. The usual approach is to factor analyse the set of items for each CSF separately to check for ''unifactoriality'' or ''unidimensionality''. A factor is ''unifactorial'' if all its items estimate only one construct. The number of cases in this study was rather small to perform a good factor analysis. In this respect, many arbitrary ''rules of thumb'' exist that specify the required number of cases, but there is however, no absolute scientific answer to this issue (Edari, 2004). Nonetheless, the authors felt that conducting the factor analysis was better than not performing any in order to give an indication of the construct validity of the CSFs. The Kaiser-Meyer-Olkin (KMO) value was used to determine the appropriateness of the data sets for the factor analysis; a value greater than 0.5 represents an acceptable condition (Field, 2000; Black and Porter, 1996). As can be seen in the second column of Table 3, this requirement was met by all the factors. In first factor analysis problematic items were identified and eliminated based on the criteria and approach adopted by Yusof and Aspinwall (2000). A secondary factor analysis was then performed on those factors which were not ''unifactorial''. The results of this second run showed all the factors to be ''unifactorial'' and therefore, have construct validity. Table 3 presents the final summarised results of the factor analysis. As can be seen, more than 57 per cent of the variance of each set of items was accounted for by its respective factor. In essence, all the tests conducted above proved that the CSFs developed in this study were both reliable and valid.

Factors	No.of items	Original alpha value	Item deleted	Final alpha value
Leadership	7	0.7113	-	0.7113
Culture	8	0.8424	2.5	0.8687
Information	6	0.8424	-	0.8825

technology				
Strategy	6	0.8623	-	0.8623
Measurement	5	0.8739	5.5	0.9047
Training and Education	5	0.8889	-	0.8889
HRM	5	0.8344	11.3	0.8506
Benchmarking	5	0.7437	-	0.7437

Factors	KMO value	Item deleted	Factor loading	Eigen value	Percentage variance explained
Leadership	0.512	1.5	0.604-0.826	3.520	61.997
Culture	0.763	–	0.706-0.870	4.002	57.170
Information technology	0.696	-	0.733-0.872	3.828	63.807
Strategy	0.677	–	0.597-0.906	3.604	60.067
Measurement	0.808	–	0.848-0.908	3.124	78.100
Training and Education	0.800	–	0.746-0.896	3.555	71.096
HRM	0.640	–	0.743-0.885	2.787	69.675
Benchmarking	0.735	8.4	0.583-0.829	2.299	57.476

Table3- **Final** result of factor analysis

6- Ranking of the CSFs

Finally, participants were asked to rank 8 statements, which represented the CSFs (but were worded slightly differently), in order of importance from 1 to 8. The top three factors according to the participants were ''senior management support and leadership'', ''a knowledge-friendly culture'' and ''a clear strategy for managing knowledge'', while the bottom three were ''development of a technological infrastructure'', ''benchmarking KM best-practices'' and ''measuring the effectiveness of KM''.

Factors	Rank of importance score
Leadership	2
Culture	1
Information technology	6
Strategy	3
Measurement	8
Training and Education	5
HRM	4
Benchmarking	7

Table4- Ranking of CSFs: Factors

7- CONCLUSION

Under the influence of the advancement of information technology with economic globalization, many enterprises have started to actively implement knowledge management and knowledge management systems with

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the goal of obtaining their future competitive edge – "knowledge." Since, people are the source of knowledge production, the application of knowledge management systems include more than just the digitalization of documents, the setting up of the system, or the application of information technology. It is also a mixture of a combination of various factors resulting in the difficulty of implementing such systems. Therefore, if enterprises can be certain of the key drivers for implementing knowledge management systems, then they will be able to speed up the efficiency of knowledge management and make the process of implementation much easier and successful. This research first concludes that leadership and senior management commitment, culture, information technology, measurement, training and education, HRM, strategy and benchmarking are eight of the drivers in knowledge management systems implementation, based on past-published papers. Through the previous studies, we have found that for the strategy and leadership driver the most important part is to obtain the support of the top managers. For the culture driver, the important part is the forming of a culture of sharing but needs to be supplemented by information technology. For the HRM driver, other than the training courses, the channels of learning and the incentive program for the employees are also key drivers. As for the information technology driver, other than the digitalization of the documents, the speedy search of knowledge for its re-use is becoming more and more important. For the training and education driver the most important part is member awareness of the needs to manage knowledge and trained to use KM systems for manage it. Important part for measurement is to track the progress of km and to determine its benefits and effectiveness. At the end of this paper we propose a model according to the mentioned drivers and Jennex and Olfman success model. In this model we showed the role of each of these drivers and the middle factors which are necessary for the success of KM implementation such as User satisfaction and Perceived Usefulness which all together led to successful implementation of KMS. The conclusion of this article is that the KM Success Model is a useful model for predicting KM success. It is also useful for designing effective KMS.

8- RESOURCES

[1] Y. S. Choi. An empirical study of factors affecting successful implementation of knowledge management, PhD Dissertation, The University of Nebraska, Lincoln, 2000.

[2] C. W. Holsapple, and K. D. Joshi. *An investigation of factors that influence the management of knowledge in organisations*, Journal of Strategic Information Systems, vol. 9, no. 2/3, pp. 235-61, 2000.

[3] D. Skyrme and D. Amidon. *The knowledge agenda*, Journal of Knowledge Management, vol. 1 (1) pp. 27- 37, ,1997.

[4] E.Jennex, and L.Olfman. *A Model of Knowledge Management Success*, International Journal of knowledge management, vol 2, Issue 3, 2006.

[5] J. F. Rockart. *Chief executives define their own data needs*, Harvard Business Review, vol. 57, no. 2, pp. 81- 93, 1979.

[6] J. Liebowitz. *Key ingredients to the success of an organisation's knowledge management strategy*, Knowledge and Process Management, vol. 6, no. 1, pp. 37-40,1999.

[7] K.Al-Mabrouk. *Critical Success Factors Affecting Knowledge Management Adoption: A Review of the Literature*, IEEE, 2006.

[8] K. Y. Wong. *Critical success factors implementing knowledge management in small and medium enterprises*, Industrial Management & Data Systems, vol. 105(3), pp. 261-79, 2005.

[9] M.Alavi, D.Leidner. *knowledge management systems: Emerging views and practices from the field*, 32nd Hawaii International Conference on System Sciences, 1999.

[10] M.Plessis. *Knowledge management: what makes complex implementations successful?,* Journal of Knowledge Management, vol.11 no.2 pp.91-101, 2007.

[11] P. Chourides, D. Longbotton, and W. Murphy. *Excellence in knowledge management: an empirical study to identify critical factors and performance measures*, Measuring Business Excellence, vol. 7 no. 2, pp. 29-45, 2003.

[12] T. H. Davenport, D. W. De Long, and M. C. Beers. *Successful knowledge management projects*, Sloan Management Review, vol. 39, no. 2, pp. 43-57, 1998.

[13] T.Butler, C.Heavin, F.O'Donovan. *A Theoretical Model and framework for understanding Knowledge Management System Implementation*, Journal of Organizational & End User Computing, Volume 19, Issu 4, 2007.

[14] T. Davenport, and P. Klahr. *Managing customer support knowledge*, California Management Review, vol. 40, no. 3, pp. 195-208, 1998.

[15] Y. C. Hung, S. M. Huang, Q. P. Lin & M. L. Tsai.*Critical factors in adopting a knowledge management system for the pharmaceutical industry*, Industrial Management and Data Systems, vol. 105, no. 2, pp. 164-83, 2005.

[16] Y.Ying-Jung, L.Sun-Quae, H.Chin-Tsang. *Knowledge management enablers: a case study*, Industrial Management & Data systems, vol.106 no.6 pp. 793-810, 2006.

[17] F. Hasanali. *Critical success factors of knowledge management*, [Online]. Available : http:// www.kmadvantage.com/docs/km_articles/Critical_Success _Factors_of_KM.pdf, 2005.