Implementation of KM strategies in the Malaysian telecommunication industry

An empirical analysis

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Abstract

Purpose – This purpose of this paper is to assess the perceived importance and actual implementation of four knowledge management (KM) strategies, i.e. culture; leadership; information technology; and measurement, in the Malaysian telecommunication industry.

Design/methodology/approach – Data were collected from 289 telecommunication organizations in Malaysia and analyzed using indices and parametric statistics.

Findings – The paired *t*-test results show significant differences among all the KM strategies in terms of their importance and actual implementation. Strategies such as technology, culture and leadership are moderately implemented, with measurement being the least implemented factor.

Research limitations/implications – This paper focuses on KM implementation rather than on learning and knowledge utilization.

Practical implications – Malaysian telecommunication organizations should give equal attention to the implementation of all the four KM strategies. They need to have proper planning and overcome any problem or difficulty for the four KM strategies to be implemented smoothly, and subsequently narrow the gaps between the perceived importance and actual implementation of these strategies. Such viable practice will significantly help the government of Malaysia to achieve the K-Economy status and Vision 2020.

Originality/value – This study is perhaps one of the first to empirically investigate and compare the perceived importance and actual implementation of the four KM strategies in the Malaysian telecommunication industry.

Keywords Knowledge management, Telecommunications, Malaysia

Paper type Research paper

Introduction

The telecommunication industry in Malaysia has experienced significant growth in recent years. For example, the use of broadband services was only at 0.85 percent in 2004 but its usage was targeted to increase to 10 percent by 2008 (Lim, 2004). The mobile market has been more spectacular, jumping from three million subscribers in

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1999 to over 20 million in early 2006, continuously growing at an annual rate of about 25 percent. In addition, the main telecommunication provider in Malaysia, i.e. Telekom Malaysia (TM) projected that the number of internet subscribers in the country is expected to reach the 10 million mark in the next five years. This statement is based on the growing trend of internet users in the last three years as Malaysia moved towards advanced information, communication and multimedia services. In 2004, the number of subscribers was 2.9 million, in 2005, it increased to 3.5 million subscribers, and in 2006 the number of subscribers in Malaysia was close to five million.

Rapid development of the internet and information technology has pushed telecommunication organizations into the era of a new competitive business environment. The increasing globalization of businesses, leaner organizations, products and services convergence and vast development of technologies (Davenport and Prusak, 1998) implied that a more efficient and effective operation of the telecommunication organization's knowledge assets has become more important than ever before. Hence, Malaysian telecommunication organizations need to play a proactive role in leading and transforming the Malaysian economy into a knowledge-based economy (Chong *et al.*, 2006a). As such, telecommunication organizations are starting to understand and appreciate knowledge as the most valued asset in the emerging competitive environment (Syed-Ikhsan and Rowland, 2004).

However, an investigation on knowledge management (KM) studies conducted so far revealed that only two studies have been conducted with regards to KM implementation in the telecommunication industry. A preliminary study done by Chong and Yeow (2005) in the Malaysian telecommunication industry reported that most of the telecommunication organizations in the country are at the beginning stage of KM implementation. Meanwhile, Chong *et al.* (2006a) focused their study on the perceived importance and actual implementation of five preliminary KM strategies or success factors, which consist of organizational structure, business strategy, knowledge team, knowledge audit, and knowledge map, in the Malaysian telecommunication organizations. The results show that the organizations are aware of the importance of all the KM preliminary strategies but fall short of implementation, particularly knowledge audit and knowledge map.

For an effective KM implementation, the findings from leading KM researchers and recent surveys' evidence demonstrate that there are other strategies or success factors in addition to the ones discussed by Chong *et al.* (2006a). However, to date, none of the published KM studies have been conducted on KM strategies in the telecommunication industry. In addition, while many KM strategies have been proposed, many of them remain theoretical and lack of empirical evidence. As such, to assess the readiness of the Malaysian telecommunication organizations in the implementation of KM strategies, this paper serves as an extension to Chong *et al.*'s (2006a) study where four key KM strategies will be studied among the Malaysian telecommunication organizations in order to examine the gap between their perceived importance and their actual level of implementation. The next section presents the literature review on the four KM strategies that have garnered impressive theoretical and practical support.

Four key KM strategies of KM implementation

Wong (2005) defined KM strategies or success factors as key activities or practices that should be addressed to ensure the successful implementation of KM. With respect to

this, Coukos (2001) opined that the main challenge confronting organizations is to use the key strategies of building culture, providing leadership, using technology, and conducting measurement to create well-integrated business processes of generating, codifying and transferring knowledge throughout an organization. In short, these KM strategies are broadly identified as culture, leadership, technology, and measurement (APQC, 1997, cited in Coukos, 2001; Davenport and Prusak, 1998; O'Dell and Grayson, 1998; Sveiby, 2000). These strategies work hand-in-hand to streamline and enhance the capture, flow, and transfer of an organization's information or knowledge for the purpose of delivering it to individuals and groups engaged in accomplishing specific tasks (Dove, 1998; Prusak, 1998; O'Dell and Grayson, 1999; Sveiby, 2000). They are specifically discussed in the subsequent sections.

Culture of knowledge sharing

Culture refers to an integrated pattern of human behavior – including thoughts, speeches, actions, and artifacts (Coukos, 2001), while knowledge sharing refers to activities of transferring or disseminating knowledge from one person, group or organization to another (Lee, 2001). There is a general agreement that a knowledge-sharing culture must be present or nurtured in order for KM implementation to be successful. This is because a company's ability to use knowledge depends primarily on the level of enthusiasm among employees that is ultimately influenced by the organization's culture.

For knowledge to be shared, there should be strong love, caring and trust among an organization's members (DeTienne and Jackson, 2001; Lee and Choi, 2003; Stonehouse and Pemberton, 1999; Von Krogh, 1998; Von Krogh *et al.*, 2000). When knowledge is shared, it becomes cumulative and embedded within an organization's processes and services (Demarest, 1997). A knowledge sharing workplace can create more opportunities for learning and make retention and other workforce issues less problematic (Hacket, 2000). Without a high degree of mutual trust, people will be skeptical about the intentions and behaviors of others and thus, this will create a likelihood for them to withhold their knowledge (Wong, 2005). Therefore, in order to promote the sharing of values and knowledge, a proper organizational climate has to be created and preserved in a strategic way. Companies should foster an environment and culture that support continuous learning (Chong and Choi, 2005).

Leadership

Leadership refers to the ability of an organization to align KM behaviors with organizational strategies, identify opportunities, promote the values of KM, communicate the best strategies, facilitate the evolution of learning organizations, and provide metrics for assessing the impact of knowledge (Coukos, 2001).

Many researchers have insisted that top management leadership and commitment are the most critical factors for successful KM implementation (Chong and Choi, 2005). This is because leadership develops business and operational strategies for organizations to survive and prosper in today's dynamic environment. These strategies help to align KM with business tactics to drive the value of KM throughout an enterprise. Leadership's primary focus is to encourage processes that will promote cross-boundary learning and sharing. This includes helping to set up and possibly, fund knowledge workers, as well as defining and developing the skills of learning from

other people (Mayo, 1998). Additionally, leaders are also involved in establishing a culture that respects knowledge, reinforces it's sharing, and builds loyalty to an organization. Notwithstanding this, leadership also focuses on establishing a knowledge infrastructure and support system that enhances and facilitates the sharing and application of knowledge at the appropriate levels.

Companies that are serious about knowledge often create knowledge leadership positions in which the incumbents set the course and attend to the knowledge creation process. Leaders who are sensitive to the dynamics of an organization's culture and who examine the norms, ideologies, attitudes, and behaviors that characterize this culture can minimize conflicts and enhance further development and attainment of broad-based shared goals (Chermark, 1990).

Information technology

Technology refers to the infrastructure of tools, systems, platforms, and automated solutions that centralize and enhance the development, application, and distribution of organizational knowledge (Coukos, 2001). According to Davenport and Prusak (1998), the goal of technology is to take knowledge that exists in human heads and make it widely available throughout an organization. It provides the foundation for solutions that automate and centralize the development, application, deployment and sharing of knowledge. As such, it is not surprising that information technology has been identified as one of the most critical success factors in KM implementation (Chong and Choi, 2005).

However, King (1996) asserted that the successful development of KM requires an organization to think in terms of its applications and how people use them, not systems and software. Coleman (1999) supported this notion that KM tools are the enablers which support the transportation, creation, distribution and sharing of knowledge. To ensure success, the combination of intelligent agents (human values) and technical tools can provide the basis for long-term organizational effectiveness for firms that wish to institutionalize KM (Carneiro, 2001). This is because it is important to realize that KM is less of a technical problem, but more of a cultural problem (Call, 2005). Technology can assist a well-established KM initiative, but it will not succeed based solely on technology.

Measurement

Measurement acts like a data collection system that gives useful information about a particular situation or activity (Wong, 2005). It refers to the assessment methods of KM and its relationships with organizational performance. Measuring KM efforts towards improving organizational performance has become increasingly important and in fact many researchers have found a positive relationship between the two (Chong and Choi, 2005).

Many researchers have reiterated that knowledge must be measured because an organization's intellectual capitals include the brains of its employees, their know-how, the processes, and customers' knowledge that they create. Thus, it is clearly necessary to include a performance measurement system as a key factor for successful KM implementation (Barsky and Marchant, 2000; Bassi and Van Buren, 1999; Bukowitz and Petrash, 1997; Martinez, 1998; Pearson, 1999).

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. Hence, it is important that traditional hard measures are supplemented by soft non-financial measures in order to provide a more holistic approach to measuring KM (Ahmed *et al.*, 1999; Chong *et al.*, 2006b). Some of the methods used include intellectual capital metrics (Bontis, 2001; Liebowitz and Suen, 2000; Sveiby, 1997) and the balanced scorecard (Arora, 2002; Kaplan and Norton, 1992). Nevertheless, there is still no absolute method for measuring KM in an organization (Gupta *et al.*, 2000), and this is an area that is still being explored by academics and practitioners (De Goojier, 2000).

In summary, the literature has provided evidence on the importance of the four KM strategies or success factors (culture, leadership, information technology and measurement) towards the successful implementation of KM in organizations. It is essential to build and develop a knowledge sharing culture as knowledge becomes cumulative and embedded within an organization's processes and services when it is shared. Leadership and commitment from top management must be sustained throughout the KM activities where only strong leadership support will enable the successful deployment of KM. Technology is an enabler of KM and it provides the foundation for solutions that automate and centralize the development, application, deployment and sharing of knowledge. Finally, measurement and evaluating organizational knowledge can help to make a company more efficient, profitable and competitive.

Even though these four KM strategies have been widely acknowledged in the literature as success factors for KM implementation, in many instances, many of the prior studies are theoretical in nature with limited empirical evidence. Very few attempts have been undertaken to investigate these strategies in terms of their degree of importance and extent of implementation. Furthermore, these factors have not been tested in the telecommunication industry. Given the relative importance of this industry to the economy of Malaysia and other nations, it is timely for a survey to be conducted in this industry. An empirical analysis on the importance and implementation of the KM strategies will enable the identification of gaps. Suggestions can then be recommended to narrow these gaps. The next section will discuss the methodology used in the survey.

Methods

Convenience sampling, a non-probability sampling technique was employed in this study. The target respondents in this study were middle level managers from various functional areas working in the Malaysian telecommunication organizations. The list of organizations was obtained from an online page, "Telecommunication services in Malaysia: a market analysis" (www.gii.co.jp/english/ae11397_telecom_malaysia_toc.html) and TM online yellow pages (www.yellowpages.com.my/psearch/index.jsp?sf = wandp = 7and name = telecommunication + companies). About 800 middle managers were identified and questionnaires were distributed to all of them. A total of 289 responses were obtained, yielding a response rate of 36 percent.

The questionnaire consists of two sections. The first section surveyed the respondents' demographic information such as gender, age, their functional areas and stages of KM implementation in their organizations. Since this study focuses on the

telecommunication organizations and not on individual respondents as aligned to the objective of this study, the demographic information of the individual respondents will not be reported in this paper. Only the stages of KM implementation in their organizations will be used as items of interest in order to provide meaningful interpretations and inferences to the findings of questions listed in section two of the questionnaire.

The second section consists of 20 questions measuring the respondents' perceived importance and the degree of implementation of the four KM strategies in their organizations. The questions were designed based on the review of prior literature and the modification of the survey done by Arthur Andersen Consulting and American Productivity and Quality Center in 1997. Interval scale was used where the items in the survey asked the respondents to indicate the level of importance and implementation of each strategy using a five-point Likert scale from 1 (not important at all/not implemented at all) to 5 (very important/extensively implemented).

The reliability test conducted separately on all the strategies yielded Cronbach Alpha values of above 0.90 for the degree of perceived importance and above 0.92 for the degree of actual implementation. Since they fall within the acceptable range of alpha value (Nunnally, 1978), the factors tested in this study are considered to be highly reliable. To ensure face validity, pilot studies were conducted using 30 middle managers from among 12 telecommunication organizations. Based upon their feedback, some amendments were made on the questionnaire before the questionnaire was distributed. In addition, this study also found a high degree of construct validity for the KM strategies (as illustrated in Table I, the factor analysis results show that the percentage of variance explained by each of the factor is considerably high). As such, the items or attributes are deemed fit to be included in the current study.

In addition, two indices, i.e. strategy index (SI) for importance and implementation are calculated to examine the degree of perceived importance and the degree of implementation of the four KM strategies. These indices are adopted from Coukos (2001) in his national survey on KM process and strategies in research universities. A mean rating for each KM strategy is calculated by taking the average of means from all the items related to that strategy. A higher mean rating indicates that the particular strategy is more important or implemented, as compared to other strategies. Then, the SI is calculated by summing all the mean ratings of the four KM strategies, and dividing this by the total maximum score of the four strategies, i.e. 20 (maximum score for each strategy is 5). This index shows the overall substantiation of importance and the overall substantiation of implementation of the four KM strategies. Coukos (2001) proposed that an index between 0.20-0.45 is considered as minimal, 0.46-0.70 is considered as moderate, whilst 0.71-1.00 is considered as substantial. This study adopts the same rules. The mean ratings of all the items or attributes were also ranked and paired t-tests were used to compare the degree of importance and degree of implementation of the four KM strategies. The next section presents the survey results.

Results

Level of KM implementation

About 29.8 percent of the respondents indicated that they were implementing a full scale KM program in their organizations. About 37 percent of the respondents

Factors	FL (PI)*	FL (AI)**
Factor 1: technology		
1. IT help to gather information we need	0.907	0.931
2. Information is always up to date	0.892	0.925
3. IT expedites the decision-making process	0.889	0.926
4. The technology facilitates sharing of knowledge throughout organization	0.880	0.903
5. Current information system is able to support future expansion	0.868	0.928
Eigenvalue	3.937	4.258
Variance (%)	78.73	85.169
Factor 2: culture		
6. Communication of success stories is widely encouraged within the organization	0.873	0.89
7. Knowledge does not threaten positions in organization	0.857	0.90
8. The organization aligns rewards and recognition with knowledge sharing	0.853	0.839
9. There is a culture of openness and trust	0.852	0.889
10. Organization encourages empowerment and participation in decision making	0.849	0.861
Eigenvalue	3.672	3.839
Variance (%)	73.439	76.778
Factor 3: leadership		
11. There is stated vision for managing knowledge	0.907	0.904
12. The organizational strategic plan focuses on knowledge management	0.904	0.907
13. Top management recognizes that knowledge assets can add value	0.903	0.903
14. Top management shows commitment toward KM initiative	0.899	0.899
15. There are dedicated personnel who lead and support KM activities	0.897	0.897
Eigenvalue	4.068	4.258
Variance (%)	81.356	85.167
Factor 4: measurement		
16. Performance measurement facilitates us in gauging KM implementation success	0.916	0.916
17. Our employees know what metrics are used to monitor the KM performance	0.911	0.904
18. Both quantitative and qualitative indicators are used to evaluate KM performance	0.911	0.911
19. Intangible assets are being evaluated	0.904	0.887
20. The organization uses performance measures or indicators to evaluate the KM success	0.887	0.911
Eigenvalue	4.101	4.352
Variance (%)	82.023	87.044

Notes: *FL (PI) – Factor loading for perceived importance; **FL (AI) – Factor loading for actual implementation

Table I.
Factor analysis for degree of importance and implementation of KM strategies

indicated that they had already implemented one or more pilot applications on KM while 31.8 percent were at the planning and evaluation stage.

Factor analysis

To confirm the theory, factor analysis was conducted on all the items or attributes that measure the degree of importance and degree of implementation of the four KM strategies. Nunnally (1978) stated that an item with low item-total correlation indicates that the item is not drawn from the same domain and should be deleted to reduce error and unreliability. Hence, items with similar loading on two factors and items with loading less than 0.50 should be removed.

Table I shows the factor analysis results of the four KM strategies in terms of their degree of importance and implementation. In both cases (degree of importance and implementation), four factors were extracted, with each having 5 items or attributes. All the factors were shown to have eigenvalues greater than 1, and they explained more than 70 percent of the variances. No items were dropped since all of them have coefficients of over 0.50.

Mean ratings

As shown in Table II, the respondents viewed technology as the most important strategy, followed by leadership, culture and measurement. The overall importance of the KM strategies was substantial (SI of 0.79). As for actual implementation, technology was the most implemented strategy across all organizations while the least implemented strategy is measurement. The overall implementation of the KM strategies was moderate (SI of 0.63). Therefore, it confirms the results of factor analysis and prior literature that all the four KM strategies are considered important by the Malaysian telecommunication organizations.

However, these KM strategies fall short of implementation. This finding is similar to Coukos's (2001) results where there are gaps between the degree of importance and implementation of KM strategies, with the degree of importance receiving higher ratings as perceived by research universities. The results also corroborate Chong *et al.*'s (2006a) findings where the degree of implementation of KM preliminary success factors is much lesser compared to the degree of importance perceived by the Malaysian telecommunication organizations.

Table II also illustrates the mean rating (MR) for both the degree of perceived importance and the degree of actual implementation of the 20 attributes concerning the four KM strategies. There are all together seven attributes that scored higher than a MR of 4.00. The four most important attributes come from the information technology factor, i.e. "IT helps to gather information we need" with a MR of 4.1, "current information system is able to support future expansion" (MR = 4.10), "information is always up to date" (MR = 4.08) and "the technology facilitates sharing of knowledge throughout organizations" (MR = 4.07). This is followed by three attributes from the leadership factor, i.e. "top management recognizes that knowledge assets can add value" (MR = 4.03), "top management shows commitment towards KM initiatives" (MR = 4.02) and "there is stated vision for managing knowledge" (MR = 4.01).

There are 13 attributes that scored MRs lower than 4.00. The two lowest rated attributes are related to the measurement factor, i.e. "intangible assets are being

Survey items	Perceived importance Rank	Mean	SD	Actual implementation Rank	Mean	SD
Technology						
The technology facilitates sharing of knowledge throughout organizations	4	4.07	0.933	1	3.33	1.301
IT helps to gather information we need	1	4.10	0.900	2	3.31	1.219
IT expedites the decision-making process	8	3.99	0.920	3	3.28	1.199
Current information system is able to support future expansion	2	4.10	0.821	4	3.22	1.294
Information is always up to date	3	4.08	0.911	6	3.15	1.291
Group mean score		4.07	0.044		3.26	0.048
Culture						
The organization aligns rewards and recognition with knowledge sharing	16	3.91	0.924	11	3.04	1.185
Knowledge does not threaten positions in organization	14	3.91	0.905	9	3.08	1.167
Communication of success stories is widely encouraged within the organization	9	3.96	0.942	5	3.17	1.191
There is a culture of openness and trust	13	3.92	0.938	16	2.93	1.210
Organization encourages empowerment and participation in decision making	15	3.91	0.897	10	3.07	1.157
Group mean score		3.92	0.020		3.06	0.021
Leadership						
Top management shows commitment toward KM initiatives	6	4.02	0.984	8	3.11	1.161
Top management recognizes that knowledge assets can add value	5	4.03	0.907	7	3.15	1.159
The organizational strategic plan focuses on knowledge management	11	3.94	0.959	13	3.01	1.126
There is stated vision for managing knowledge	7	4.01	0.918	12	3.03	1.174
There are dedicated personnel who lead and support KM activities	18	3.89	0.951	15	2.95	1.280
Group mean score		3.98	0.031		3.05	0.059
Measurement						
The organization uses performance measures or indicators to evaluate the KM success	12	3.93	0.908	17	2.91	1.237
Both quantitative and qualitative indicators are used to evaluate KM performance	19	3.89	0.906	18	2.91	1.226
Intangible assets are being evaluated	20	3.84	0.934	20	2.86	1.201
Our employees know what metrics are used to monitor the KM performance	17	3.91	0.922	19	2.90	1.243
Performance measurement facilitates us in gauging KM implementation success	10	3.95	0.927	14	2.95	1.307
Group mean score		3.90	0.012		2.91	0.039
KM strategy index (SI)		0.79			0.63	

Table II.
Attributes of KM strategies

evaluated" (MR = 3.84) and "both quantitative and qualitative indicators are used to evaluate KM performance" (MR = 3.89). The third lowest attribute comes from the leadership factor, i.e. "there are dedicated personnel who lead and support KM activities" (MR = 3.89). Other attributes with lower ratings come mostly from the cultural and measurement factors. However, since all the attributes scored a MR higher than 3.80, they are perceived to be important and/or very important. The standard deviation scores for all the attributes were below 1, indicating that the respondents have consistent views towards all the items surveyed.

However, the respondents have different opinions when it comes to the degree of implementation of the KM strategies. The four most implemented attributes come from technology – "the technology facilitates sharing of knowledge throughout organizations" (MR = 3.33), followed by "IT helps to gather information we need" (MR = 3.31), "IT expedites the decision making process" (MR = 3.28), and "current information system is able to support future expansion" (MR = 3.22). Other attributes with relatively high levels of implementation come mostly from the cultural and leadership factors.

There are seven attributes which scored mean ratings lower than 3.00. The four lowest rated attributes were related to the measurement factor. The attribute "intangible assets are being evaluated" (MR = 2.86) was found to be the least implemented attribute. This is followed by attributes "our employees know what metrics are used to monitor the KM performance" (MR = 2.90), "both quantitative and qualitative indictors are used to evaluate KM performance" (MR = 2.91) and "the organization uses performance measure or indicators to evaluate the KM success" (MR = 2.91). Other attributes receiving lower ratings than 3.00 are those attributes from the cultural factor (there is a culture of openness and trust, MR = 2.93); leadership factor (there are dedicated personnel who lead and support KM activities, MR = 2.95) and measurement factor (performance measurement facilitates us in gauging KM implementation success, MR = 2.95).

The paired t-test results shown in Table III indicate that there were significant differences between all the four KM strategies in terms of their perceived importance and degree of implementation, with an average mean difference of 0.90 ($p < 0.05$). This shows that these strategies were not implemented by the telecommunication organizations to the extent that they were perceived as important, thus confirming the results reported in Table II.

KM strategies	Difference mean	*t*-value
1. Technology	0.81	12.51*
2. Culture	0.86	14.19*
3. Leadership	0.93	14.03*
4. Measurement	1.00	14.31*
Average mean difference	0.90	

Note: *$p < 0.05$

Table III.
Comparison of the perceived importance and implementation of KM strategies

Discussion and implications

The results revealed that about 66.8 percent of the Malaysian telecommunication organizations have implemented or attempted to begin implementing KM in their organizations while 31.8 percent of them are at the evaluation stage. This implies that 98.6 percent of the respondents see KM as important to their future business success and therefore, have taken measures to implement it in their organizations. This can be seen from the factor analysis results presented in Table I. The results imply that the Malaysian telecommunication organizations view all the KM strategies as important and to some extent, have implemented them. Furthermore, the high factor loadings indicate that the results of this study are congruent with theory and practice.

To some extent, the importance of these KM strategies is reflected by the results in Tables II and III. The organizations are aware of the importance of KM strategies (SI = 0.79). However, when it comes to the implementation of these strategies, the results seem to indicate that the telecommunication organizations are not prepared in doing so (SI = 0.63). The findings have been further confirmed by the paired t-test results in Table III. Strategies such as technology, culture and leadership are moderately implemented, with measurement being the least implemented factor. This implies that the organizations might not understand the whole spectrum of KM implementation, or at least as far as these strategies are concerned. This is not surprising as only 29.8 percent of the organizations have implemented a full-scale KM program. Organizations that have just begun to implement KM might not be able to identify the requirements for a full-fledged KM implementation. The lack of its understanding among the organizations might lead to an improper planning of KM activities, which could result in difficulties in the implementation process.

This finding is not uncommon as it is in line with the results of many prior research (Choi, 2000; Chong, 2006; Chong *et al.*, 2006a; Chong *et al.*, 2006b) conducted in different sectors in Malaysia and also in the US. Such consistent findings lead one to safely conclude that the lack of guidance for proper KM implementation has caused the organizations to overlook some of the important strategies. As such, it is timely for this study to be conducted so that recommendations can be made to organizations, particularly those in the telecommunication industry, on how these four KM strategies can be best implemented. The recommendations are outlined in the following sub-sections.

Technology

Technology is being rated as the most important and implemented KM strategy. The results make sense since most of the telecommunication organizations are equipped with advanced technological tools and methods due to their competitive environment. They are the users of multimedia/IT products and services, as such they are expected to be knowledgeable on the type of technological tools used in their organizations. Furthermore, many of them have equated KM to technology, and this belief might have led them to perceive their intensive technological usage as suitable platforms for KM implementation.

However, a significant gap between the degree of importance and implementation of the technology strategy suggests that there is more to be done by the telecommunication organizations surveyed in order to bridge the gap. For organizations that have just started to implement KM programs, information

systems/technology cannot play a significant role unless they already have proper KM systems in place (Chong, 2006). As Savary (1999) pointed out, information systems cannot play a vital role unless organizations are finally ready to implement KM. Furthermore, the initial cost of building information technology infrastructures is high (Nath, 2000). Information technology changes rapidly and becomes obsolete quickly and therefore, investment in information technology requires constant and continuous attention to enable organizations to build their core competencies. In this case, since most of the companies surveyed have just begun their operation in KM, they are still developing their information technology infrastructure.

To enhance the implementation level, the creation of knowledge-based systems or knowledge technology from the methods of knowledge engineering will produce better KM practices among the telecommunication companies. This is because knowledge engineering involves the acquisition, storage and use of knowledge from experts in the domain for which the knowledge technology is to be created (Milton *et al.*, 1999). The organizations can consider adopting some of the popular IT tools for managing knowledge such as relational databases, text and document search engines, data warehouses and data sharing tools (Davis and Riggs, 1999). Another important tool to be considered in KM implementation is groupware. It has the ability to send and receive e-mails, share personal calendars, hold computer conferencing, and execute workflow management (Kilmer, 1999). Examples are Lotus Notes, intranet, internet, electronic conferencing tools and many others. The communication and coordination activities of team members are facilitated by technologies that bridge the time-span, space, and level of group support (DeSanctis and Gallupe, 1987) which enhance collaborative decision-making in organizations (Baldwin *et al.*, 2002). This will facilitate communication, bring together multiple perspectives and expertise, save time and cost in coordinating group work, facilitate group problem-solving, and enable new modes of communication, such as anonymous interchanges or structured interactions.

It is also important for the management of these telecommunication organizations to ensure that their employees know how to use these tools by sending them for training programs. 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 standardization of a knowledge structure or ontology (Wong, 2005). However, it is important to realize that technology can assist a well-established KM initiative, but it will not succeed based solely on technology (Call, 2005). Information technology is only a tool but not an ultimate solution (Wong and Aspinwall, 2003). It is imperative for the telecommunication organizations to realize that any KM system has to be people-based, not technological-based (Chong and Choi, 2005).

Culture

The cultural factor encompasses elements such as employee involvement, employee empowerment, knowledge sharing, rewards and recognition, openness and trust, etc. (Chong and Choi, 2005). The middle managers of these organizations seem to understand the importance of culture. They realize that a knowledge sharing culture is one of the most important elements that needs to be understood before implementing any new strategy in their organizations. They do develop a culture of confidence and

trust to encourage the application and development of knowledge. However, this factor is only moderately implemented by them.

In order to enhance its implementation level, it is important for the telecommunication organizations to practice an open culture built around integrating individual skills and experiences with organizational knowledge. As Gupta *et al.* (2000) opined, such a cultural practice increases the likelihood for a KM program to be successful. Buckman (1999) has pointed out that creating and sharing knowledge are intangible activities that cannot be forced. To promote the sharing of values and knowledge, these telecommunication organizations must create and preserve a proper organizational climate in a strategic way. This is because the foundation of KM is people. People create knowledge, new ideas, new products, and they establish relationships that make processes truly work (Eisenberg, 1997; Wah, 1999). Therefore, people have to be motivated to access and share information and to convert that information into knowledge (Brand, 1998). There is a need to foster an innovative culture in which individuals are constantly encouraged to generate new ideas, knowledge and solutions. In order for employees to be knowledgeable, they must be allowed to experiment in order to learn from failures. Employees in these organizations should not be afraid of committing mistakes, and should be encouraged to share the lessons learned so that the same mistakes will not be repeated (Ndlela and Toit, 2001).

In addition, employee involvement is one of the most effective problem-solving and process improvement principles (Silos, 1999). Many KM activities are unthinkable without employee involvement (Choi, 2000; Chong, 2006; Chong and Choi, 2005). Moreover, Verespej (1999) claimed that the real advantages of KM implementation could not be realized without truly empowering the employees. If employees are to feel empowered, they need knowledge that will enable them to comprehend and contribute to the performance of an organization (Bowen and Lawler, 1992). This is because when individuals are empowered, they begin to take extra responsibilities to solve organizational problems by learning new skills in their jobs (Anahotu, 1998), which will eventually lead them to become more competent.

Therefore, the human resource departments of these telecommunication organizations play an important role in creating a supportive environment for KM programs. They could facilitate regular staff meetings to exchange knowledge, create office space for staff to meet informally, develop trust between employees, create a learning environment far from fear of punishments and penalties, practice a greater degree of empowerment and employee involvement, and develop a reward system based on knowledge sharing.

Leadership

Many empirical studies have confirmed that commitment and support from top management are the most common formulas to succeed from the initiation to the implementation of KM (Brand, 1998; Choi, 2000; Davenport and Prusak, 1998; Hansen *et al.*, 1999). However, the results show that there is a significant gap between the degree of importance and implementation of KM. This contradicts with the findings of Chong's (2006) study where the companies surveyed are fully aware that a successful KM program needs fundamental organizational commitment.

One possible reason for this gap is that KM is still new to the telecommunication industry and therefore, there is a lack of capable and experience leaders in managing KM effectively. To ensure a more successful KM implementation, the top leaders of these telecommunication organizations should give their full commitment to provide the necessary direction for their KM activities, including encouraging knowledge linkage. A good leadership will provide a proper environment in which the workers will be stimulated and motivated to create, organize and share knowledge. Industry best practices can be identified and better methods for solving enterprise-wide problems can be established. At the same time, good employees can be retained in the organization (Chong *et al.*, 2006b). The telecommunication organizations should realize that without the top management support, the success of KM activities is cumbersome (Chong and Choi, 2005).

Since KM in the telecommunication industry is new, appointment of knowledge leaders or chief knowledge officers (CKOs) from sources outside the organization is strongly encouraged. These new "outside" individuals are more likely to possess knowledge that the individual within the firm does not know. These organizations should acknowledge a CKO's key function, i.e. his/her understanding of the organization and its business drivers, combined with an ability to take a holistic view of the company and to understand the mix of hard and soft skills necessary to create, sustain and utilize the firm's knowledge base (Jones *et al.*, 2003). A CKO can then work with a KM team to facilitate knowledge sharing and increase the effective use of organizational memory by working with other employees throughout the organization to codify and institutionalize new knowledge. This will eventually lead the telecommunication companies towards better performance.

Measurement

Measurement is considered the least implemented factor among the four KM strategies. This finding is, however, consistent with Chong's (2006) finding. Pearson (1999) pointed out that the delivery of KM to an organization could be started by establishing an appropriate performance measurement system. It can thus be concluded that the respondents were not aware of the implications of performance measurement due to the fact that many of them have just started to implement KM programs. It is also difficult to establish a balanced and effective performance evaluation mechanism to judge KM activities in the short-term, when they are just beginning to enter the KM system environment. They are still unsure of how their performance measurement system would fit into a knowledge-based company. Furthermore, the development of a comprehensive performance measurement system has yet to exist, and therefore, the respondents lack proper guidance when it comes to developing one.

These organizations should realize that a complete measurement system needs to be developed in order to evaluate whether their KM activities lead to the enhancement of their performance. They can adopt a combination of measurement approaches which include quantitative methods, qualitative assessment, performance review and benchmarking (Hiebler, 1996) rather than based solely on the existing accounting systems due to the tacit nature of knowledge and its dynamism (Lin and Tseng, 2005). These firms should understand that by depending on financial measures alone, they will not be able to evaluate the results of KM appropriately (Tiwana, 2000).

Another approach to be considered by the telecommunication organizations in evaluating the standing of a firm's knowledge is to adopt the method suggested by Bohn (1994). Bohn proposed a progress of growth of knowledge in an organization that can be described in eight stages: complete ignorance, awareness, measure, control of the mean, process capability, process characterization, know why and complete knowledge. His framework provides an excellent way to figure out where an organization stands, relatively in terms of its knowledge. Notwithstanding this, the balanced scorecard technique (Kaplan and Norton, 1992) can also be used by the telecommunication companies as a suitable tool to measure their KM strategies against organizational performance.

Conclusions

This study extends knowledge in KM, especially concerning the implementation of KM strategies within the telecommunication industry. This study serves as a foundation for building a cumulative tradition of research, particularly in an industry that is in its early stage of KM implementation. It serves as a guideline for those practitioners to undergo a self-check and to help them to rethink and reposition themselves in light of these findings. This helps to ensure that essential strategies are considered when they initiate KM implementation in their organizations.

To achieve success in identifying the best value of their knowledge assets, the telecommunication organizations need to give equal attention to the implementation of all the KM strategies. The telecommunication organizations need to have proper planning and overcome any problem or difficulty in order for the four KM strategies to be implemented smoothly. Consequently, this would help them to achieve higher competitiveness and better performance.

It is hoped that the suggestions proposed in this paper would help the telecommunication organizations to enhance their level of KM implementation and subsequently narrow the gaps between the perceived importance and actual implementation of all the four KM strategies. Furthermore, with KM, such viable practice will significantly help the government of Malaysia to achieve the K-Economy status and Vision 2020.

This study attempts to measure the implementation of KM strategies in the private sector, i.e. telecommunication organizations. Thus, a retest of the survey instrument with different industry groups and sample size may be interesting. Studies on federal or state government, or other public sector organizations such as ministries, local authorities, hospitals, militaries etc, could yield different results. Cross-industry and cross-cultural comparative analyses of KM implementation among countries or cultural groups are recommended for future research. It is also interesting to study the effects of moderating factors have on KM strategies, which is an area lacking in research. In addition, as the field of KM advances, further studies on the identification of other important KM strategies are warranted.

However, the limitation of this paper is that it focuses on KM implementation rather than on learning and knowledge utilization, i.e. two promising areas in which future research should address (Biloslavo, 2005; Choi *et al.*, 2004; Kodama, 2005; Melton *et al.*, 2006). This study did not purport (and could not be possible) to develop a comprehensive picture of the "best practices" in organizational KM implementation for the telecommunication industry. Indeed, it attempted to create a snapshot of an

effective implementation of KM strategies and to create a basic topology of strategic approaches towards knowledge. It therefore establishes a baseline description of KM practices in the telecommunication companies.

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