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A Managers' Guide to KMS Adoption and Diffusion

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ABSTRACT

This paper reports and summarises the important findings of a study into the factors that influence the adoption and diffusion of knowledge management systems (KMSs) in Australian organizations. The implications for managerial practices are discussed. The future research directions are also presented.

Keywords: Research Summary, Managerial Implications

1. INTRODUCTION

There has been a major shift towards a knowledge economy over the past decade. Coupled with extreme competition, shorter product life-cycles, and rapid development in technology, organizations are paying more attention to safeguarding their knowledge-based assets. Knowledge is now considered the most important organizational asset for obtaining sustainable competitive advantage (Wiig, 1997). Organizations are paying more attention to organizational knowledge and KM. They are looking at ways to maximize their knowledge-based assets for the purpose of staying ahead of the competition. Although knowledge and knowledge management (KM) are not new concepts, knowledge management systems (KMSs), which involve the application of IT systems and other organizational resources to manage knowledge strategically in a more effective and systematic way (Alavi & Leidner, 1999), are a relatively recent phenomenon. While a KMS (or some version of it) is widely applied in organizations, the topic has not been well explored by researchers and scholars in an empirical way. There is a scarcity of empirical studies of KMSs, especially in the area of their adoption and diffusion. This paper reports the findings of an Australian study of KMS adoption and diffusion in organizations. This study was done in a comprehensive manner and findings have been reported elsewhere on different aspects of the study (Quaddus, Xu & Wood, 2002; Quaddus and Xu, 2002; Quaddus and Xu, 2003; Xu, Quaddus & Wood, 2001). This paper presents a summary of the findings and articulates the managerial implications of them.

The paper is organized as follows. The capstone summary of the study findings is presented in section 2. Section 3 presents the comprehensive managerial implications of the results. The conclusions and future directions are presented in section 4.

2. CAPSTONE SUMMARY OF THE STUDY FINDINGS

This research attempts to get answers for the research question: What are the factors that influence the adoption and diffusion of knowledge management systems (KMSs) in Australian organizations? In doing so it identifies the factors affecting the diffusion of KMSs based on selected Australian companies at both the organizational level (identifying what causes organizations to adopt and implement a KMS) and the individual level (identifying what causes individuals/end users to accept or reject a KMS). The study also focuses on identifying the relationships between the external influences, the perceptions of the KMS, and the diffusion of KMSs in Australian organizations to answer the second research question: What must be done for the successful diffusion of a KMS? The research proposes and examines a model of KMS adoption and diffusion developed from both the literature review and practical field studies. The details of the study can be found in Xu, Quaddus & Wood, 2001; Quaddus, Xu & Wood, 2002; Quaddus & Xu, 2002; Quaddus & Xu, 2003; and Xu, 2003. The research has resulted in a number of findings to explain the adoption and diffusion of KMSs in organizations:

1. Perceived usefulness has a positive relationship with an organization embarking on a KMS. Perceived user-friendliness has a significant effect on the initiation of a KMS indirectly through perceived usefulness. Perceived usefulness is the primary driver of an organization's interest in seeking a KMS to manage its knowledge in a better and more effective way.
2. People's decision to accept and use a KMS is directly determined by perceived user-friendliness and perceived voluntariness jointly. Meanwhile, perceived usefulness also has a significant effect on people's decision to use the system. But user-friendliness has the greatest total effects on an individual's intention to use the system, followed by perceived usefulness, and then perceived voluntariness.

3. The impact of individual differences and task complexity on the organization's decision about KMS adoption and diffusion is mediated by the perceived usefulness.
4. The influence of individual differences and task complexity on people's use of a KMS is mediated by the perceived usefulness.
5. The KMS diffusion process consists of six stages: initiation, adoption, pilot implementation, organic growth, organizational implementation, and diffusion/sustained use of KMS.

The details of the results can be found in Xu, Quaddus & Wood, 2001; Quaddus, Xu & Wood, 2002; Quaddus & Xu, 2002; Quaddus & Xu, 2003; and Xu, 2003.

3. MANAGERIAL IMPLICATIONS

The results of this study have significant implications for managerial practices. The managerial implications arising from this study are discussed from various perspectives:

- ◊ The need for a KMS
- ◊ Approach to implementing a KMS
- ◊ Cost of a KMS
- ◊ The comprehensive model of KMS adoption and diffusion
- ◊ Significant factors of KMS adoption and diffusion
- ◊ End-user focus and involving people in the KMS
- ◊ Organizational adjustment to embrace the KMS
- ◊ Role of top management in KMS implementation
- ◊ Technology for the KMS
- ◊ Suggestions for KMS adoption and diffusion

The Need for a KMS

It is necessary for organizations to adopt and implement a KMS to survive competition and gain competitive advantage in the knowledge economy. Organizations need better control of the knowledge they already have. Many organizations do not know what they have. KMSs have the ability to make an organization better and help individuals do their jobs better. A KMS can make a contribution in the following areas (see Quaddus & Xu, 2002):

- Help decision-makers cope with challenges and problems.
- Make people more effective in their jobs.
- Inspire people to become more creative in their jobs.
- Make organizations more productive.
- Cut operating costs and time for production and product development by avoiding the need to reinvent the wheel.
- Increase people's knowledge and enlarge their knowledge base.
- Avoid repeating the same mistakes.
- Provide better service to customers.

Approach to a KMS

A KMS is a broad way or approach to deal with the management of both tacit and explicit knowledge. This notion is supported by the majority of the survey respondents (see Quaddus & Xu, 2002). Many organizations do not have a KMS even though they have a number of systems that are consistent with a KMS. But they have not put the whole package together. A KMS consists of a number of elements, such as structure, culture, job descriptions, information technology (IT), processes, procedures, etc. A KMS is also a multi-process. It actually touches every part of the business and everything the organization does. At the same time, IT can be an important enabler to support KM in various ways. The KMS is a much broader subject than IT. It is a way, mechanism and structure to manage organizational knowledge. Organizations should focus on building a knowledge-sharing culture and structure as well as people's capabilities before they adopt or build a system.

The first necessary and important step for setting up an effective KMS is to review the way an organization operates and determine the easiest method of collecting and transferring the important types of knowledge, which will provide competitive advantage (Mazzie, 2000). The organization should understand what knowledge means to its business and find out what the potential impact of the knowledge will be. It has to identify what might be worth doing and where the leverage points might be. For example, the most important knowledge domains identified in this study were knowledge of customer services, knowledge of strategic planning, knowledge of marketing sales, knowledge of competition (see Quaddus & Xu, 2002), which implies that when an organization is developing its KMS, it should include this knowledge into its KMS and provide cost-effective access to these knowledge areas. Furthermore, the cost-benefit analysis of a KMS can also be linked to organizational performance in the corresponding perspectives, such as customer satisfaction, business strategy development, product development and innovation, time to market, product promotion, market share, competitive positioning, and so on (Alavi & Leidner, 1999). The results of this study suggest that a KMS has the capability to provide both external knowledge (such as customer information, competitive information, market information, business partner information, and supplier information) and internal knowledge (such as operations information, human resources information, financial and accounting information) to people. That will help them figure out how to structure, allocate responsibilities and draw the process through the business. The first thing in KM is addressing the different areas of knowledge content and business processes relating to knowledge that are critical to the business. Then the organization should

adjust its business processes and organizational structure accordingly to embrace the KMS.

Cost of a KMS

In the survey, the respondents reported the total cost of KMSs in their organizations up to the time the questionnaire was answered as ranging from less than AUST$100,000 to more than AUST$1,000,000 (see Quaddus & Xu 2002). However, these figures should be interpreted with caution since there are difficulties in accounting for building, operating and maintaining a KMS, and also in measuring the system benefits (Sarvary, 1999). Before organizations put KMSs into place, they have to look at their corporate infrastructure (Brooking, 1999). Corporate infrastructure includes a broad range of infrastructure assets, such as management philosophy, corporate culture, management and business processes, financial relationships, methodologies, and IT systems (Brooking, 1999). The investment on a KMS should cover both technological infrastructure (i.e., KMS technologies – both hardware and software, MIS department, etc) and organizational infrastructure (i.e., user training, rewards for knowledge sharing, changing organizational culture, structure, etc).

A Comprehensive Model of KMS Adoption and Diffusion

This research presents a practical model of KMS diffusion. All the factors/sub-factors and variables have been obtained from the literature and the real world. A close examination of the model reveals that all the factors/sub-factors ultimately lead to sustained use of a KMS. Companies planning to embark on a KMS can consider the variables of the model (see Xu, Quaddus & Wood, 2001) as criteria for the successful diffusion of a KMS. It must be noted that not all the criteria of the comprehensive model will be applicable to all companies. A careful analysis is first needed to select the appropriate criteria for a company. A multiple-criteria modelling approach can then be undertaken to assess the suitability of the company for KMS adoption and diffusion. A similar modelling approach can also be undertaken to find the type of KMS suitable for a company (Quaddus & Achjari, 2001).

As per the factors and variables in the model, an organization can predict whether the system will be suitable for the organization and be accepted by the users when it is embarking on a KMS. The factors and variables in the model will also help the organization to diagnose the possible reasons for unsuccessful implementation and diffusion, and take corrective action to increase the acceptability among the end users and integrate the KMS into its business processes for the purpose of maximizing business performance and optimizing business impact.

Significant Factors of KMS Adoption and Diffusion

This research identifies three of the most significant perception-related variables in the KMS adoption/diffusion process, namely usefulness, user-friendliness and voluntariness of a KMS. The implication is that any KMS has to be extremely user-friendly for any level of users to use it effectively; it has to be useful for the task and a policy must be implemented to facilitate the voluntary use of the KMS. It is noted that any kind of norm (pressure) creation is unlikely to make it grow effectively within the organization.

The results show perceived user-friendliness has more influence on people's use and continued use of a KMS than perceived usefulness, and suggest that an organization should advocate the user-friendliness/ease of use of the KMS when it promotes and implements a KMS. Meanwhile, when the organization is deciding to embark on a KMS, it should pay more attention to the benefits the system can bring to the organization rather than spending too much time on looking for, or designing, a user-friendly system. It should be understood that the ultimate purpose of the KMS is to improve the performance of the organization and individuals. No amount of user-friendliness can substitute for the usefulness/benefits of a system (see Xu 2003).

All the hypotheses related to the sequence of the KMS diffusion process (see Quaddus & Xu, 2003) were found to be significant. This is an important and significant finding. It clearly demonstrates how KMS adoption and diffusion should be planned in Australian organizations. A well-planned sequence must be adopted for the effective adoption and diffusion of KMSs.

End-user Focus and Involving People in the KMS

An organization should build or adopt a KMS, which is user-focused and can bring benefits to everyone in the organization. If individuals do not commit to and support the KMS, it will never happen. Organizations should adopt and implement a user-friendly KMS, otherwise people may not use it even though it is useful. Organizations should only establish a KMS that people want to use. They should shift their attention from the hardware and software perspectives of a KMS, and pay more heed to the effects of people problems and motivational problems (Huber, 2001). If user-centered principles are followed, the required KM activities will automatically be identified as the KM project proceeds (Robertson, 2002). It will be of greater value for everyone in the organization if people shared their knowledge. And everyone can enjoy the benefits of sharing knowledge and using the KMS.

When an organization is embarking on a KMS, it should encourage people's involvement in the system and local ownership of the system, which will have an impact on people's decision to accept and use the system. Users

are both beneficiaries of, and contributors to, the KMS (Alavi & Leidner, 1999); as a result, people must be involved in KMS development and maintenance. In other words, people should be invited to participate in KMS activities all the time and right from the beginning.

At the same time, the organization should ensure that everyone understands that an important part of their working life is to learn as much as possible, contribute knowledge to the system, and participate in the dissemination of knowledge (Pan & Scarbrough, 1998). Also, the organization should motivate and reward early adopters of the KMS. By doing so, the critical mass of KMS use can be achieved, and more people will be willing to share their knowledge and make a contribution to the system (Bansler & Havn, 2002). But the positive incentive scheme aimed at encouraging people's use of, and contribution to, the system should be carefully monitored since an overemphasis on rewarded behaviour may induce people to focus on quantity rather than quality of knowledge submission to the system (Bansler & Havn, 2002).

It is seen that, in the KMS adoption/diffusion process, individual factors/differences of end users and task complexity are the significant factors influencing the perceived usefulness of a KMS (see Quaddus & Xu, 2002). This provides an interesting challenge for would-be adopters of KMSs in Australian organizations. Top-level executives of these organizations should plan carefully as their support does not guarantee a positive influence on the usefulness of a KMS. They must look deeply into the task factors and the end users to see if they are conducive to KMS use. Prior to introducing a KMS into the organization, top management should ensure that: (1) people are involved in the KMS adoption and implementation, (2) people have the experience/skills to use computer systems (both software and hardware), (3) people understand what knowledge the organization has and where and how to locate it, (4) people have time to document what they have done, and are encouraged to try new things. The organization should also examine task complexity by looking at a number of multidisciplinary complex projects, the amount of knowledge required for the business to grow, and the need to effectively track and reapply past best practice.

The mediating effects of perceived usefulness between external variables and KMS adoption/diffusion (see Quaddus & Xu 2002) suggest that organizations probably should put more emphasis on shaping and forming the perceived benefits/usefulness. The organization's effort of implementing a KMS might be more fruitful when management's attention focuses on the development of perceptions of usefulness of the KMS rather than implementation issues. Successful implementation will take place if the formation of perceptions is properly handled (Agarwal & Prasad, 1999).

At the meant time, the significant and positive impact of people's perceptions of voluntary use (i.e., the extent of KMS use to perform the tasks required by management and the extent of KMS use required in their job description) on the organic growth of KMS use (see Quaddus & Xu, 2002) indicates that, management pressure may not make people use the KMS. They have to educate and persuade people to use the system. They have to create an environment in which people feel comfortable and willing to use the system.

Organizational Adjustment to Embrace the KMS

The organization should have a KM strategy, otherwise its KM activities will be somewhat ad hoc. Effective KM practices start with a KM strategy. The KM strategy is the vision for an organization's effort in managing knowledge.

An important factor in ensuring the success of a KMS is to identify the business processes of most value to the organization. An integration of the KMS and business processes can help demonstrate how shared knowledge can generate immediate and highly visible returns to both individuals and the organization as a whole (Mazzie, 2000). The KMS must acknowledge an organization's business and business processes since the ultimate purpose of the system is to bring benefits to the organization and improve its performance.

Organizational culture is the set of values, beliefs, norms, and expectations that are widely held in an organization (Huber, 2001). In order to successfully implement a KMS, an organization should work on building a knowledge-sharing and pro-KM culture as well as an organizational structure. The organization should have a culture in which everyone is prepared to share knowledge and knowledge sharing is rewarded. In other words, an organizational culture in which seeking, sharing, and applying knowledge is the norm in the context of a KMS (Huber, 2001). Changing the existing culture and people's work habits is the first hurdle for most KM programs (McDermott, 1999). Chase (1997), Zyngier (2002), The Conference Board (1997), The Delphi Group (1997), and others state that the lack of a knowledge-sharing culture is the biggest obstacle to KM.

KM involves breaking down barriers. Hence, organizations should not operate in a silo structure. The ideal structure for knowledge sharing and effective KM is the matrix structure and team-based approach, in which the teams work across the organization. The KMS has to comply with the organizational structure. If an organization really practices KM, it should continually make adjustments to the organizational structure to facilitate the process.

Structure also influences the use of a KMS. The way an organization is structured in terms of lines of

responsibilities and accountabilities will reinforce the use of the KMS. Probably the most difficult thing for any organization's implementation of KMS is to set up the structure and build enough definition into it so people can retrieve what they want while allowing flexibility. The organization should encourage the practice of knowledge sharing through the linking of 'communities of practice' (i.e., people who perform similar tasks and functions but who are geographically dispersed), which can result in the organization's use of employees' expertise to maximize efficient product and service delivery (Mazzie, 2000).

Role of Top Management in KMS Implementation

At the same time, top management should take the initiative and express strong support for the KMS by appointing KM positions and allocating a KMS budget. Even though some rigor in implementing the KMS may be helpful, management should focus on persuasion and education.

Top management's role in implementation and diffusion of the KMS lies in creating an environment in which people feel comfortable and are willing to use the system. Although management can provide leadership in KM, the management on its own may not always be sufficient to stimulate and sustain effective KM practices.

In order to make the transferring/sharing of knowledge a common practice in the organization, management has to ensure the implementation of policies and reward systems to encourage knowledge sharing. Management should also lead the knowledge sharing practices by setting a good example themselves. They must become users of the KMS.

Training can enhance the use of a KMS through building up people's competence and confidence to try and adopt it. Training will help end users overcome the fear of complexity of the KMS. Although in-class training can provide people with certain skills and knowledge (explicit knowledge), tacit knowledge is developed through hands on practices.

Technology for a KMS

An integrated, integrative, and adequate technology infrastructure is a key driver for KMSs. KM is not new to organizations. For example, organizations have been practising knowledge coding and transferring, such as employee training and development programs, organizational policies, routines, procedures, reports, and manuals, for many years (Gottschalk, 1999). What is new and exciting in KM is the potential use of information technologies (e.g., internet, intranet, data warehouses, search engines and tools, among many others) to help an organization in managing knowledge in a more systematic and effective way (Gottschalk, 1999; Alavi & Leidner, 1999). In other words, the key elements of a KMS, such as people and expertise, already exist; there is a need of good KM technology to do it in a smart way (Phillips Fox, 1998). Clearly, the current rapid development in technologies has empowered the opportunities for knowledge sharing and combination (Nahapiet & Ghoshal, 1998).

The various KMS technologies and applications can be classified into three categories: database and database management systems, communication and messaging, and browsing and retrieval (Alavi & Leidner, 1999). Some of the common functions of KMS technologies and tools are (1) organizing and sharing/transferring of internal benchmarks/best practices, (2) constructing corporate knowledge directories, such as corporate yellow pages, people information archives, etc., (3) creating knowledge networks and knowledge maps; among many others (Alavi & Leidner, 2001). This study found that the top 10 most widely used KMS technologies were (in order): e-mail and communication systems, internet, databases, intranet, document management systems, customer management systems, video conference, online discussion forum, workflow systems, data warehousing/mining, and search and retrieval tools (see Quaddus & Xu, 2002).

In some organizations IT leads KM, and in others it facilitates KM. The best way is for IT to facilitate KM, and not be KM. Most organizations are not in the IT business and do not exist for IT. Technology only puts different components of the system together. There is no doubt that KMSs need technology since it can provide assistance and facilitation in various dimensions of the KM process, namely: knowledge capture and documentation, knowledge storage, knowledge sharing and access, knowledge reuse and application. Technology can make a KMS happen.

Suggestions for KMS adoption and diffusion

Finally, based on the KMS adoption and diffusion model, which has been proved to be valid and significant, this research offers some suggestions to assist in the implementation of a KMS in organizations:

- Top-level executives of would-be adopters (organizations) of a KMS should plan carefully as their support does not guarantee a positive influence on the usefulness of the KMS. They must look deeply into the task factors and the end users to see if these factors are conducive to KMS use.
- The KMS system has to be extremely user-friendly. For any level of user to use it effectively, it has to be useful for the task to be dealt with and a policy must be implemented for the system to be used on a voluntary basis. Any kind of norm (pressure) creation is unlikely to make it grow effectively within the organization.

- A well-planned sequence of KMS adoption and diffusion has been mentioned in Quaddus and Xu (2003), but is reintroduced here since we feel it is essential to the success of KMSs in organizations.
  - ⇒ Research the organization's challenges and people's needs regarding knowledge, i.e., identify the important knowledge domains for the organization.
  - ⇒ Search for suitable applications for the KMS.
  - ⇒ Develop a KMS plan/strategy.
  - ⇒ Allocate a budget for the KMS.
  - ⇒ Appoint a knowledge manager or a chief knowledge officer.
  - ⇒ Build up/set up the KMS.
  - ⇒ Test the KMS through pilot implementation on a limited basis in the organization and optimize the system according to feedback.
  - ⇒ Work on the organizational culture and structure to facilitate implementation of the KMS.
  - ⇒ Persuade and educate people to use the KMS.
  - ⇒ Provide people with continuous training and support to encourage their use of the KMS.
  - ⇒ Encourage people to go through a process of self-learning.
  - ⇒ Implement the KMS throughout the organization.
  - ⇒ Cut off people's old means of accessing knowledge.
  - ⇒ Develop an organizational-wide interest in using the KMS.
  - ⇒ Monitor people's use of the KMS.
  - ⇒ Keep providing the knowledge people want in the KMS.
  - ⇒ Promote best practice.
  - ⇒ Develop and encourage people's sustained use of the KMS.
  - ⇒ Make using the KMS a part of the organization's business.

4. CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

The results of this research can help organizations that are currently practising KM or are planning to embark on a KMS, by enhancing their understanding of a KMS and providing them with a checklist of the important variables in the KMS adoption and diffusion model with which to do an internal audit to find out how they fare in terms of these variables. The results of this research also provide guidelines on successfully implementing KMSs in organizations. Meanwhile, even though this research was conducted in Australian organizations, its results will apply to different organizations in various countries across the globe because of its generic approach.

An interesting future study could be looking at the differentiation among the types of KMS adopters. According to Rogers' (1995) theory of innovation diffusion, there are five types of adopters. The first to adopt a KMS are the innovators, who adopt it because of its intrinsic values, including perceived user-friendliness/perceived ease of use. Later, the early adopters adopt it since it is able to provide competitive advantage. Only then the early majority adopt it for pragmatic reasons, such as return-on-investment, cost and benefit. They are followed by the late adopters and conservatives, who wait until the KMS is very well established. Most adopt a new IT for the sake of its extrinsic value, such as perceived usefulness (Moore, 1991). At the mean time, the results of this study were obtained from large Australian organizations. The validity of generalizing these results to other countries or small firms is yet to be determined. Furthermore, this study only reflects and measures a snapshot situation of KMS adoption and diffusion at a particular point in time. Future research could do longitudinal studies to have a better understanding of the process of KMS adoption and diffusion.

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