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Mohammad Reza Behboudi



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The role of human and technical intermediaries in successful knowledge reuse

Mohammad Reza Behboudi, School of Accounting and Business Information Systems
Australian National University College of Business & Economics,
Email: mohammad.behboudi@anu.edu.au

Abstract

The nature of competition in many industries has moved more and more toward knowledge-based resources; consequently, the optimum reuse of valuable internal knowledge via organisational knowledge management systems (KMSs) is increasingly important for the achievement of competitive advantage. A literature review has revealed that organisational, individual and knowledge repository factor, influence successful explicit knowledge reuse. I argue in this paper that intermediaries, including humans and information technology (IT), can be a major factor in the success of the reuse process. However, the types of intermediary and the roles that they can play are less than clear. This study therefore will conduct a case study methodology to explore knowledge intermediaries and the functions that they can perform to increase knowledge reuse.

Keywords: *knowledge reuse, knowledge intermediary, knowledge management system, success factors, information technology*

Introduction

Due to the importance of knowledge for organisations, the issue of better managing a firm's intellectual assets to achieve competitive advantage has received noticeable attention by researchers (Argote and Ingram, 2000, Markus, 2001, Watson and Hewett, 2006, Silvi and Cuganesan, 2006, Davenport et al., 1998). Specifically, the ability to manage and leverage valuable existing internal knowledge is critical for competitive advantage due to its importance in achieving organisational objectives, and the difficulty and expense of creating new knowledge (Szulanski, 1996). One important way of leveraging existing knowledge is through the transfer and reuse of existing firm-specific knowledge (Watson and Hewett, 2006). Reusing knowledge throughout the firm has been linked to a firm's performance through its influence on innovation and other competencies (Lindvall et al., 2003, Edvinsson et al., 2004). For example, Majchrzak et al. (2004) have indicated the relationship between knowledge reuse and innovation. Studies have revealed that most of the organisations researched believe that much of the knowledge that is necessary for their success exists inside the organisation (Alavi and Leidner, 2001). Moreover the author's pilot study that surveyed the opinion of participants in the actKM-2005 conference in Australia revealed that almost all participants believed there was a gap between knowing and doing in organisations, and about 75 per cent believed organisations did not make full use of their available knowledge or organisational memory (Behboudi, 2006). Therefore, there is a need for organisations to know how to find, transfer and make organisational knowledge available for reuse.

Importance of research issue

KMSs, or knowledge repositories, are important in knowledge transfer and reuse. Studies have indicated that firms significantly improve their performance by using a KMS, and that if managers and employees have access to KMSs, they can efficiently review and effectively retrieve updated knowledge and information to lead them to better decision-making (Feng et al., 2004/2005). Appropriate KMSs can lead to competitive advantage by saving time and

money through reusing and analysing existing knowledge rather than re-creating it; KMSs can also help by enabling the creation of new and deeper knowledge (Ofek and Sarvary, 2001). However, merely installing a KMS does not guarantee organisations' success with their Knowledge Management (KM) initiatives (Kankanhalli et al., 2005). Therefore, there is a need to improve the success of KMS implementation by better understanding the factors that are important in increasing knowledge reuse. One of the main factors is human and technical intermediaries.

Literature review

Knowledge reuse is a process that includes capturing or documenting, packaging, distributing or disseminating, and reusing knowledge (Markus, 2001). This study was inspired by Markus' (2001) theory of knowledge reusability where she proposed intermediaries as a solution for knowledge reuse. However, before I began my investigation about intermediaries, it was necessary to review the literature on the factors that influence knowledge reuse. Due to the human and technological aspects of knowledge reuse and KMSs, three important factors were found in the literature on the reuse of mostly explicit knowledge, namely: organisational, individual, and the knowledge repository or KMS.

Organisational factors

Organisational support plays a key role for KM success and consequently for knowledge reuse. Managers and organisational structures can persuade and facilitate knowledge reuse among personnel via organisational processes and routines (Venters, 2004). Knowledge transfer is a social activity occurring within an organisational or business context; therefore organisational culture can have significant positive effects on knowledge transfer by emphasising cooperation and collaboration, high levels of trust, and a problem seeking/solving culture (Lucas and Ogilvie, 2006, Goh, 2002). Also knowledge transfer is more likely in a work environment that is characterised by constant change or structural flux, or inside an organisation where information-sharing is the norm (Westphal and Shaw, 2005). Moreover, Human Resource Management (HRM) activities, which affect the absorptive capacity of knowledge receivers and foster a supportive learning environment, are directly related to knowledge transfer (Minbaeva, 2005). Therefore it is a business imperative to fully integrate the KMS into the business process, which would then deliver successful knowledge reuse (Fischer, 2002, O'Leary, 2001).

Individual factors

Sometimes, knowledge is available or accessible in organisations, but the recipient's lack of motivation, absorptive or retaining capacity leads to poor knowledge transfer (Goh, 2002). In such cases, careful use of incentives and intermediaries can be a solution (Markus, 2001). In addition, the individual's characteristics, computer literacy, general domain knowledge, and shared experience with the sources that leads to contextual understanding are important factors for knowledge reuse (Watson and Hewett, 2006, Tsai and Tsai, 2004, Majchrzak et al., 2004).

Knowledge repository factors:

Another factor is the KMS or knowledge repository, sometimes called an organisational memory system. It is an IT-based system that was developed to support and improve knowledge management processes, including knowledge creation, storage/retrieval, transfer and application (Alavi and Leidner, 2001). Efficient knowledge transfer can be improved through IT by increasing the speed of knowledge transfer and reducing costs related to time and distance (Albino et al., 2004).

Object-oriented databases that offer rich data modelling capacity and knowledge storage facilities, as well as user-friendly graphical modelling which helps users to understand the knowledge and to reduce cognitive difference, are important factors in supporting knowledge reuse (Walczak, 1998). Besides easy access to KMSs, the content of the KMS should be useful; therefore, the value of the knowledge and its trustworthiness are other factors that lead to more frequent knowledge reuse (Watson and Hewett, 2006, Szulanski et al., 2004). In addition, having the right resources deployed with knowledge of the metadata within the KMS leads to more knowledge reuse (O'Leary, 2001, Majchrzak et al., 2004, Fischer, 2002). Finally, two other important factors that facilitate and improve knowledge reuse are human and technical intermediaries (Markus, 2001).

Human and technical intermediaries

According to Szulanski (2000) the mere possession of potentially valuable knowledge does not necessarily benefit other parts of the organisation. By allowing the emergence of knowledge facilitators, practical knowledge for action is produced and shared (Roth, 2003). For successful knowledge reuse, besides creating good repositories and applying incentives, the role of intermediaries is necessary to design and support the repositories to make them useable by others (Markus, 2001). Inaccessibility, and/or the lack of end-user support for the technology's use may cause the KMS to fail; therefore, expert intervention is necessary. The following are some activities that can be performed by intermediaries to facilitate knowledge reuse (Markus, 2001):

1. abstracting, indexing, authoring, sanitising, packaging, and summarising knowledge
2. developing a knowledge map and coaching users
3. monitoring and controlling the input, and filtering and updating knowledge
4. keeping the repository sustainable and active
5. assisting content authoring of best practices
6. Facilitating knowledge flow in organisations.

Conclusion from the literature and research questions

Understanding the optimum use of organisational knowledge and the factors that lead to improved knowledge reuse is a valuable research topic. Among all the factors, intermediaries are important because they influence other factors as well. The possible influences of human and technical intermediaries on knowledge reuse are presented in Figure 1. According to this model, organisational factors directly influence the existence and improvement of intermediaries, although a human intermediary's performance can also affect organisational factors, improving performance and knowledge reuse.

In addition, human intermediaries can encourage users by designing appropriate incentives and training courses, as well as recognising users' needs. For knowledge repositories, the roles of both human and technical intermediaries are important and necessary. By applying technology, IT professionals can affect knowledge reuse by designing a user friendly and easily accessible KMS with appropriate search processes. Also some aspects of abstracting and indexing can be done by information technology. On the other hand, human intermediaries can play a useful role in controlling the input to KMSs and contextualising the knowledge. Moreover, human intermediaries prepare knowledge for reuse by eliciting, indexing, and ensuring the quality of the knowledge, and performing various roles in dissemination and facilitation.

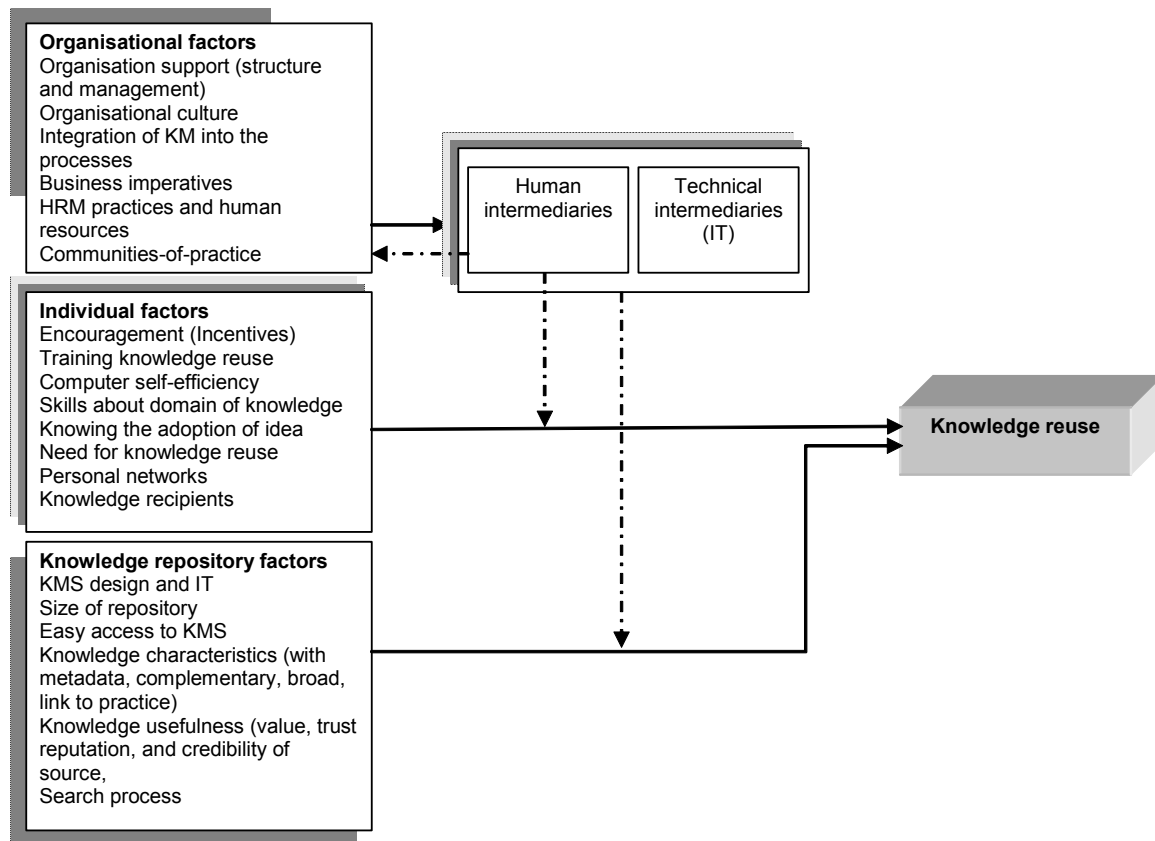


Figure 1: Possible influence of intermediaries in knowledge reuse

However, in spite of the abovementioned functions of intermediaries, it is clear that ‘facilitators and intermediaries play a still underappreciated role in knowledge reuse’ (Markus, 2001 p.84). Because the role of human and technical intermediaries in the knowledge reuse process, and the way they affect knowledge reuse is not clear, this research will contribute by providing a comprehensive study into understanding the role and importance of both intermediaries and IT in this intervention. Therefore the main **research questions** are:

1. How do human and technical intermediaries affect knowledge reuse?
2. What can be done by intermediaries to increase knowledge reuse?
3. To what extent can intervention be accomplished by technical intermediaries (IT)?

It should be mentioned that including tacit knowledge in this research can be useful, since in the facilitation of tacit knowledge reuse, intermediaries, especially human intermediaries will play an inevitable role which is, however, beyond the scope of this research and could be the subject of future research. Before being able to answer the research questions, it is necessary to investigate and understand what or who are knowledge intermediaries. The next section will explore some aspects of knowledge intermediaries including information technology.

Exploring the concept of knowledge intermediaries

When individuals interact with a knowledge repository, they can accomplish one of three roles: the knowledge provider, the knowledge seeker, or the knowledge intermediary (Bernard, 2006). The brokerage or intermediary notion has contributed significantly to our understanding in various research areas such as entrepreneurship, corporate profitability, organisational innovation, and organisational promotion (Khurana, 2002).

Based on knowledge reuse, KMSs, and the literature, knowledge intermediaries can be divided into two main types: human and technology. Human intermediaries or brokers are employees who act as a link between two or more employees for knowledge transfer; but not every actor can fulfil this knowledge broker role because brokers should have appropriate network positions to access a variety of knowledge sources (Aalbers et al., 2004). In this study a person or group of people who are in charge of knowledge facilitation in knowledge repositories will be regarded as human intermediaries.

Aalbers et al. found that externally-oriented knowledge intermediary roles (including representative, itinerant broker and liaison) in the formal network, contribute to knowledge transfer between units of an organisation. The role of human intermediaries in terms of effective KM strategies and techniques was explored by Jones et al. (2003). They argued that intermediaries such as chief knowledge officers (CKOs) or knowledge champions play the role of change agents, innovators, and opinion leaders to facilitate the acquisition and use of knowledge in firms by effectively using organisational memory systems. A CKO needs to have technical, human, and financial skills to accomplish his/her responsibilities and 'at a minimum, a CKO should have a clear understanding of knowledge management concepts, familiarity with knowledge-oriented organisations and technologies, and a strong appreciation for and grounding in the primary processes of the business' (Jones et al., 2003 p.51). Also they emphasise the importance of effective KMSs and believe that it prevents the creation of knowledge gaps when an important employee leaves the firm. Finally they offer knowledge management professionals a framework to facilitate KM activities by:

1. creating positions of dedicated organisational innovators who will facilitate the effective acquisition of new knowledge from sources outside the organisation e.g. the CKO
2. using CKOs and other knowledge champions to facilitate knowledge sharing and the effective use of organisational memory by working with opinion leaders throughout the organisation to codify and institutionalise new knowledge
3. using knowledge champions to create and update directories for appropriate knowledge centres
4. using CKOs and other knowledge champions to facilitate knowledge sharing and the effective use of organisational memory by identifying and satisfying the knowledge needs, wants, and expectations of organisational users and the organisation in general.

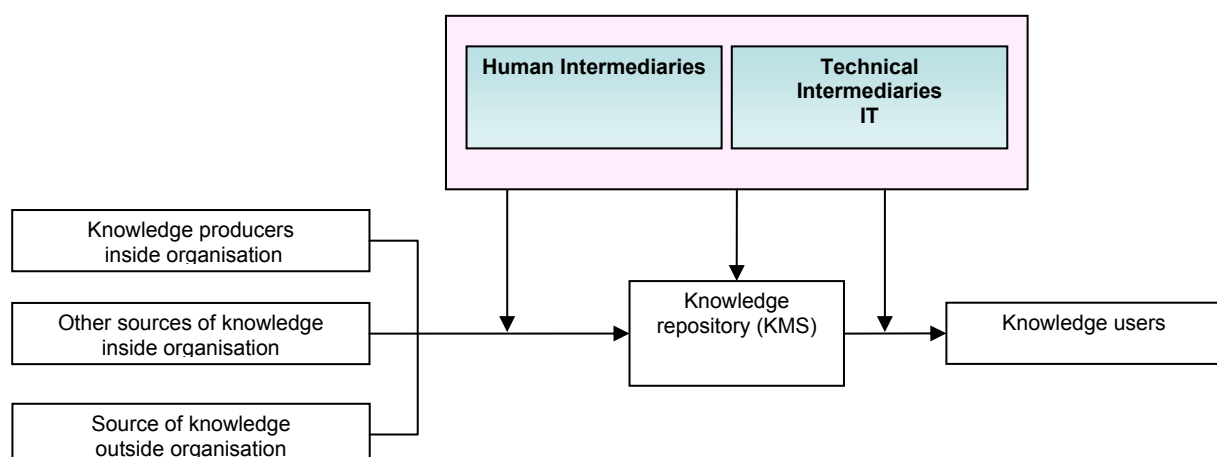


Figure 2: The influence of intermediaries in the knowledge reuse process

Figure 2 depicts the functions of intermediaries from a different point of view. The figure indicates the influence of human and technical intermediaries on knowledge reuse. It shows that intermediaries affect knowledge reuse in different stages including knowledge extraction

and collection from sources, knowledge organisation and representation in KMSs and in the reuse stage by users. Also Table 1 indicates some possible functions that intermediaries can perform to facilitate knowledge reuse based on in progress review of the literature. The aim of this research is to determine which roles human and technical intermediaries can perform to improve the effectiveness of knowledge repositories and consequently improved knowledge reuse.

Table 1: Some functions or roles that intermediaries can perform to facilitate knowledge reuse (derived from literature review)

Entities	Human intermediaries	Technical intermediaries (IT)
Knowledge users	<ul style="list-style-type: none"> • Developing knowledge map • Coaching the users to apply the knowledge and the KMS technology • Educating users about complexity of the various knowledge sources and their deficiencies and benefits • Interpreting users' needs and facilitating meeting them • Helping users with locating and analysing knowledge • Suggesting the way to manage the type and the volume of information and knowledge within the organisation • Lessening the mystique of the KMS technology • Training work with KMS and knowledge reuse • Encouraging knowledge reuse 	<ul style="list-style-type: none"> • Appropriate knowledge repositories or KMSs
	<ul style="list-style-type: none"> • Helping users in processing and reusing knowledge • Reducing the time and effort users spend on knowledge acquisition and processing • Providing human support for technology use 	
Knowledge repository (KMS)	<ul style="list-style-type: none"> • Keeping the repository sustainable and active • Validating and accrediting knowledge • Knowledge processing and combination/recombination. • Providing the metadata. 	<ul style="list-style-type: none"> • Appropriate design for KMS • Appropriate search engines • Facilitating KMS easy access • Providing and implementing appropriate knowledge management tools including: Intranets, Web portals, content management, document management systems, Information retrieval engines, relational and object databases, electronic publishing systems, groupware and workflow systems, push technologies, intelligent software agents, help-desk applications, customer relationship management, data warehousing, data mining, business process re-engineering, and knowledge creation applications.
	<ul style="list-style-type: none"> • Preparing knowledge for reuse by eliciting, indexing, abstracting, authoring, summarising, sanitising, packaging, filtering, organising, updating knowledge of repository for high quality, and dissemination and facilitation • Coding content and providing formats • Personalising the system • Developing and operating a knowledge repository in which members store their learning, and making learning available for other members 	

Entities	Human intermediaries	Technical intermediaries (IT)
Knowledge producers inside organisation	<ul style="list-style-type: none"> Monitoring and controlling the input of KMS Assisting content authoring of some knowledge like best practices Extracting all learning, generic themes of achievement and best practices 	<ul style="list-style-type: none"> IT as a transferring channel Publicising extracted knowledge for next usage
Other sources of knowledge inside of organisation	<ul style="list-style-type: none"> Encouraging knowledge and experience sharing Applying incentives for knowledge sharing 	
External sources of knowledge	<ul style="list-style-type: none"> Extracting, transferring and adopting knowledge to KMS Transferring knowledge inside the organisations 	
Organisation in general	Playing roles such as: <ul style="list-style-type: none"> Catalyst of knowledge creation Coordinator of knowledge creation initiatives Guide towards the company's knowledge vision Builder of a caring climate by raising the level of trust between members Enabler of a sharing culture Matching knowledge holders with users (tacit). 	<ul style="list-style-type: none"> Application of network technology such as video conferencing
		<ul style="list-style-type: none"> Facilitating knowledge flow in organisations by coordinating knowledge networks, offering business research, call centre, and administrating firm's databases Creating and supporting the network dynamics and facilitating communication Coordinating and facilitating, formal network beside informal network

IT as a knowledge intermediary

Information Technology, it has been argued, is an important mediator and enabler for knowledge reuse. Generally, technology is a key enabler for the implementation of KM. and IT's role is as an integrator of communications technology with its ability to support communication, collaboration, and those searching for knowledge (McCampbell et al., 1999). According to Alavi and Leidner (2001), application of IT can lead to more breadth and depth of knowledge creation, storage/retrieval, transfer, and application in organisations, and can create an infrastructure and environment that contributes to organisational knowledge management, especially in terms of explicit knowledge, through KMS. Also there is 'no single role of IT in KM as there is no single technology comprising KMS' (Alavi and Leidner, 1999 p.114). Three types of KMS can be identified (Bernard, 2006 p.2):

- *Knowledge repositories*, which provide document and information databases, search engines, and intelligent agents
- *Expert directories*, such as yellow pages and knowledge maps
- *Collaborative tools*, such as groupware, email, listserv, newsgroups, chat, and conferencing.

Other researchers, such as Lee and Hong (2002)), also believed that advanced IT was a key enabler for implementing effective KM systems; they indicated the main IT applications in KM life cycle, as shown in Figure 3. Tyndale (2002) has studied the KM tools that support KM processes; the most frequently used KM tools or technology types are categorised as: Intranets, Web portals, content management systems, document management systems, information retrieval engines, relational and object databases, electronic publishing systems, groupware and workflow systems, push technologies, intelligent software agents, help-desk

applications, customer relationship management, data warehousing, data mining, business process re-engineering, and knowledge creation applications.

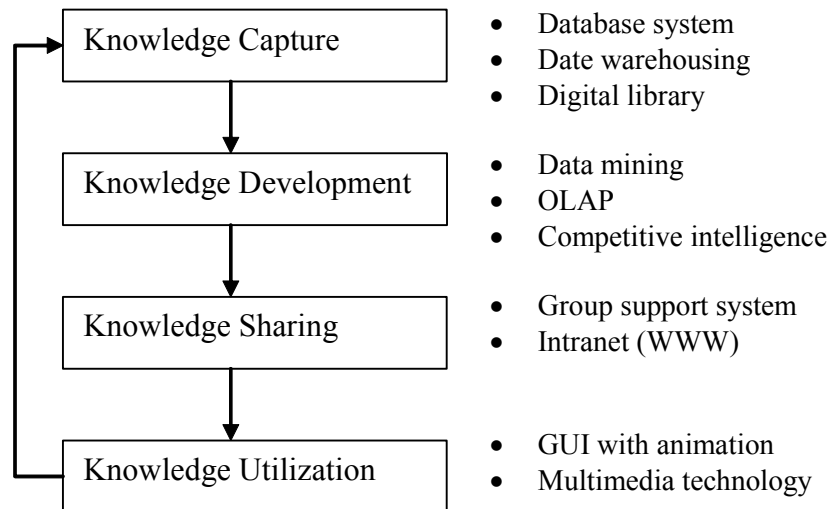


Figure 3: IT application and KM life cycle (Lee and Hong, 2002)

In addition, IT performs different roles according to the different stages of KMSs in organisations. Four stages of growth are defined as stages of KM technology, as illustrated in Figure 4 (Gottschalk, 2006):

1. Stage I: end-user-tool systems or person-to-technology, IT provides people general support with tools that improve personal efficiency, such as word processing.
2. Stage II: who-knows-what systems or person-to-person, people use IT to locate knowledge sources, such as yellow-page systems.
3. Stage III: what-they-know systems or person-to-information, IT provides information representing knowledge and people with access to information that is typically stored in documents, such as presentations and reports.
4. Stage IV: how-they-think systems or person-to-system, in which the system helps solve a knowledge problem by information processing, such as expert systems.

However, there are some disagreements about the role of IT in KM and KMS. Pfeffer and Sutton (1999) argued that KM contributed to the knowing-doing gap. This is because it mostly focuses on implementing technologies and knowledge repositories to facilitate collaboration, and treats knowledge as a tangible substance like steel, and disregards the fact that knowledge is often transferred by stories, gossip or observing one another work. They also argued that because essential knowledge for doing work is tacit and not easily described or codified, an increased emphasis on technology was not the answer. Furthermore, they criticised KM activities regarding KMS because they believed that a formal system could not easily store or transfer tacit knowledge

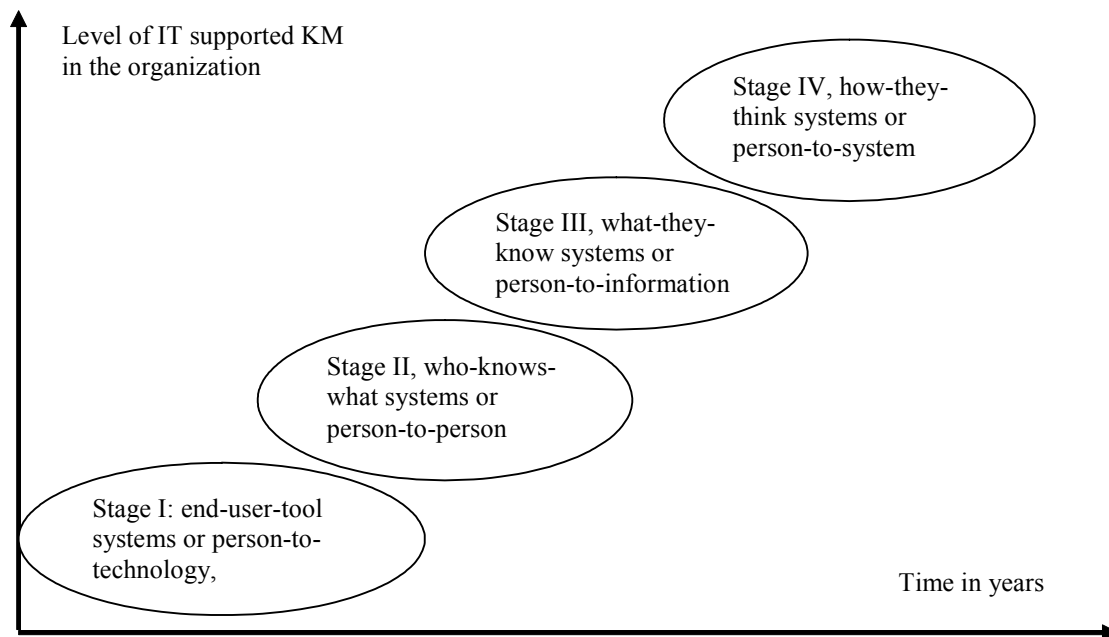


Figure 4: Stage of growth model for KM technology (Gottschalk, 2006)

McDermott (1999) also criticised the focus of KM on IT and information systems alone. He argued that ‘Knowledge is different from information and sharing it requires a different set of concepts and tools’ (p. 105). This was because knowledge was a human act, the residue of thinking, created in the present moment, created at the boundaries of the past, belonged to communities, and was circulated through communities in many ways. Accordingly its leverage required a unique combination of human and information systems to improve both information and thinking.

In spite of some disagreements about the role of IT in KM, and some debate about whether IT inhibits rather than facilitates knowledge creation and use (Cole, 1998), we assume that IT-based KMS can support organisational KM processes by various and flexible IT tools and capabilities; it can do more than traditional storage and retrieval of coded knowledge. However, IT itself is not enough and more focus on IT in KM is not appropriate, and because of this, both humans and IT are considered as knowledge intermediaries.

Research Design

The purpose of this study is to explore and understand the role of intermediaries in knowledge reuse. Due to a scarcity of previous studies about the research issue, a case study was chosen as the appropriate methodology (Yin, 2003), primarily an inductive approach adapted for this research. This is justified because the research topic is new and there is little existing literature (Saunders et al., 2003). On the other hand, issues about KM and KMS are context specific and according to Yin (2003) the case study is the best method for this situation. Furthermore, based on the research questions case study is appropriate because it has the ability to answer the ‘why’, ‘what’ and ‘how’ questions (Saunders et al., 2003). This research intends to describe the phenomenon, and test the previous theory and generate new theory, all of which are included in the purpose of case studies (Brewerton and Millward, 2001).

A combined data collection method including interviews and archive sources (documents, and the KMSs), will be used. Interviews have been chosen as the main source of data because they allow the understanding of individual opinions, and the reasons for people’s actions, and generate rich and descriptive data to understand the context. A minimum of 35 semi-

structured interviews with knowledge users, and the staff of IT and KM departments who are engaged in KMS and intermediaries functions will be conducted, with the first five interviews being exploratory. The level of analysis is knowledge repositories and knowledge reuse and intermediaries, and the unit of analysis is end-users and their knowledge reuse behaviours and attitudes regarding intermediaries. Purposeful selection of cases will be done so that the cases demonstrate the characteristics of interest (Merriam and Associates, 2002). Therefore, research candidates will be organisations which have already implemented some form of KMS.

The primary approach to data analysis will be content analysis. Also a number of strategies for supporting validity and reliability of Merriam and Associates (2002) will be considered, but have yet to be decided on.

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