

LEVERAGING IT TO SUPPORT A KNOWLEDGE ENVIRONMENT: CASES IN SMALL TO MEDIUM SIZED ENTERPRISES

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Abstract

Knowledge Management has been identified as a critical intangible asset required by organizations to be competitive and even survive in today's rapidly changing and unpredictable economic environment. Much of the research in this area focuses on how large multinational are dealing with the issues surrounding knowledge management, this work-in-progress study investigates the SME's ability to capture, store, disseminate and create organizational knowledge. This research places particular focus on IT as a facilitator for knowledge management as a means of enhancing supplier and customer relationships, and improving business processes. In this paper, a review of the literature is undertaken and a matrix mapping organizational knowledge repositories to factors influencing SME's ability to manage knowledge is proposed. Finally, a research strategy comprising a qualitative case-based approach is addressed.

Keywords: Knowledge, Knowledge Management (KM), Knowledge Management Systems (KMS), Small to Medium Sized Enterprises (SMEs), business processes.

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Suggested Track: J

Introduction

In an economic environment where organizations have been forced to take a step back and re-evaluate their core competencies and ability to innovate, organizational knowledge has come to

the forefront as a valuable strategic asset (Haghirian, 2003). While the concept of knowledge management is not new, the focus on knowledge management as a strategy has increased in recent times as organizations realise the importance of knowledge as an intangible asset contributing to the enhancement of competitive advantage (Bolloju, 2000). In the 21st century, it is believed that successful companies are those that effectively acquire, create, retain, deploy and leverage knowledge (Cecez-Kecmanovic, 2000). Knowledge work is the ability to create an understanding of nature, organizations and processes and to apply this understanding as a means of generating wealth in the organization (Boland and Tenkasi, 1995). If an organization has no specific knowledge management strategy, they are in a situation where the firm is completely dependent on the employees as a key source of knowledge and the human resource department is effectively the knowledge management system for the business (Adam *et al.*, 2000). This view is supported by Hansen *et al.*'s (1999) personalisation strategy identifying knowledge links to individuals and systems and structures that are used to aid communication instead of organising and storing knowledge. Significant studies have been carried out focusing on multinational organizations and their ability to innovate and react to their external environments, however little is known about the IT capabilities of small to medium sized enterprises (SMEs).

Theoretical Foundation

Evidently, the focus on knowledge management as a strategy has become central to organizations (Davenport *et al.*, 1998). Ichijo *et al.* (1998) view knowledge as a resource that is unique and imperfectly imitable allowing firms to sustain a competitive advantage. Additionally, knowledge management as a formalised organizational strategy is supported; it should not be left unintentional to become unsystematic and random (Ichijo *et al.*, 1998). Knowledge is identified as both explicit and tacit; this means that some knowledge may be captured on paper while other kinds of knowledge are linked to the senses, perception and intuition (Von Krogh *et al.*, 2000). Explicit knowledge is characterised by being formal and systematic in nature while tacit knowledge is more difficult to pin down, formalise and communicate (Nonaka, 1991). Following Polanyi (1966), Nonaka (1991), discusses four basic patterns of organizational knowledge. Tacit to tacit knowledge occurs when individuals share knowledge directly. Explicit to explicit takes place when an individual gathers pieces of knowledge together and codifies them into a single body of knowledge. Knowledge may also be exchanged from tacit to explicit forms when personal knowledge is openly shared. Finally, explicit to tacit occurs when new

explicit organizational information is shared and staff members internalise it. Evidently, each of these patterns of knowledge exist as dynamic entities within organizations, these patterns identified by Nonaka have been used to determine the extent to which knowledge management occurs in SMEs in both a formalised (explicit) and informal (tacit) manner.

Hansen *et al.* (1999) describe two knowledge management strategies; this includes the codification strategy which simply means storing and maintaining organizational knowledge in a database available to staff members and the personalization strategy linking knowledge closely to people and their ability to impart knowledge on a personal level. Effective knowledge management may be sustained by focusing on either of these strategies supported by the other to a lesser degree and may only exist on an equal degree where business units operate on a stand-alone basis (Hansen *et al.*, 1999). Duffy (1999) identifies six key processes that should be considered to improve an organizations knowledge management by cultivating an organization where people use the appropriate technology to grow, share and effectively apply knowledge (Figure 1).

Knowledge Management	
Learning Organisation	
Smart People	Information Technology
Tacit Knowledge	Explicit Knowledge

Figure 1: A Conceptual Model of Knowledge Management (Duffy, 1999)

Organizations try to manage two types of knowledge; tacit and explicit (Von Krogh *et al.*, 2000). In order to successfully capture, store, manage and create this knowledge the organization needs to employ smart people supported by the most fitting IT infrastructure coupled with a management strategy that encourages the right culture growing, sharing and effectively applying organizational knowledge (Duffy, 1999). Table 1 details the six processes identified in

Figure 1, this table provides a breakdown of the knowledge management processes suggested for management who intend to upgrade their organization's knowledge management strategy.

Table 1: Knowledge Management Processes (Duffy, 1999)

Knowledge Process	Proposed Action
Knowledge Management	<ul style="list-style-type: none"> • Review the strategic vision/business strategy/plan of your organization • Identify how knowledge can facilitate strategy of the organization • Develop a knowledge strategy • Prioritise knowledge management projects • Implement knowledge management projects
Learning Organization	<ul style="list-style-type: none"> • Review entire organization focusing it toward a learning environment e.g. training and development and reward system requirements. • Profile and develop a knowledge centric leadership ethos. • Profile and develop a knowledge-centric organizational culture. • Review staff and recruitment considering why smart people would work for you.
Smart People	<ul style="list-style-type: none"> • Identify knowledge characteristics of new hires. • Provide opportunities for staff to grow their knowledge. • Understand the motivation drivers for knowledge workers and support them. • Facilitate all forms of organizational knowledge sharing.
Information Technology	<ul style="list-style-type: none"> • Ensure knowledge workers are connected to corporate network. • Ensure all knowledge systems are accessible. • Ensure IT integration so that all knowledge workers may access knowledge and people both internally and outside the organization.
Tacit Knowledge	<ul style="list-style-type: none"> • Identify key tacit knowledge requirements and current availability. • Grow tacit knowledge by innovation, selective hiring and research. • Share tacit knowledge through training, mentoring etc. • Store knowledge through business processes convert to explicit knowledge.
Explicit Knowledge	<ul style="list-style-type: none"> • Identify knowledge in key database systems etc. • Grow knowledge by updating databases, refining expert systems etc. • Share knowledge through better access to corporate knowledge bases.

Each process is iterative and they are developed to adapt to a changing organizational environment. Knowledge management may be achieved if the strategy is closely aligned with the strategic needs of the organization, this process seeks to identify the organization's requirements and evaluate a knowledge strategy based on the business's strategic vision (Duffy, 1999; Carlsson, 2001). The development of the intelligent organization process focuses on the evolvement of a knowledge-centric organization, creating routines from which the staff are chosen, training and development is carried out, performance is monitored, information requirements are evaluated, communication systems are maintained and generally updating the organization's outlook, culture and ethos. Intelligent people act as the central role of the learning organization (Nonaka *et al.*, 1995; Duffy, 1999). This process is essential to the success of the knowledge management strategy; smart people must have the ability and opportunity to grow their knowledge and enable knowledge sharing both tacit and explicit. Information technology is a component of knowledge management, facilitating efficient and effective knowledge sharing, by fitting the right type of support system in a knowledge-focused organization (Khalifia *et al.*, 2001; Aidemark, 2002). Finally, the tacit and explicit knowledge processes identify the two key types of organizational knowledge. Explicit knowledge processes focus on capturing, storing and sharing knowledge held in information systems and documentation, while tacit knowledge processes are less tangible, identifying knowledge in business processes, employees and by improving training and development processes (Duffy, 1999).

Knowledge Management and IT

Knowledge management seeks to break down information into a format that may be readily available throughout the organization and stored and manipulated with other information when required. The primary objective of knowledge management is to get the right information to the right people; this is enabled by information technology (Von Krogh *et al.*, 2000). Smart people within the organization require the appropriate IT to grow and share tacit knowledge (Duffy, 2000). When considering IT enabling the knowledge management strategy it is important to recognise the difference between knowledge and information, while information is data in context, knowledge is more complex. Knowledge may be difficult to capture codify and store as it encompasses intuition, sense and personal beliefs. The dynamic, unpredictable forms in which knowledge may evolve does not always fit easily into an information system or database. Von Krogh *et al.* (2000) acknowledge that while IT actively supports and enables knowledge

management, "*Investments in information technology alone cannot make the knowledge-creating company happen*" (p27).

Additionally, while Duffy (2000) supports this view, identifying technology as a key process contributing to a successful knowledge management strategy, the admission is that IT offers a support platform for organizational knowledge but only as a component of the overall strategy. Technology provides direct support for the capture, storage and dissemination of knowledge but the interpretation process is a human driven activity, which IT is not capable of supporting (Kautz & Thaysen, 2001). IT may be identified as one factor that can enable the capture, storage, creation and dissemination of organizational knowledge, the focus on utilising organizational knowledge should be on a dialogue between two individuals or a community of practice and not knowledge objects stored in a database (Hansen *et al.*, 1998). While this may be true, significant numbers of organizations are investing in Knowledge Management Systems (KMS) specifically designed to facilitate the storing, capturing and sharing of knowledge (Bolloju, 2000). Technology implemented to enable KM may take a variety of forms. Some companies exploit the capabilities of web technology to facilitate knowledge sharing at workgroup and company levels (Davenport, 1996). Recent evidence points to the deployment of organizational systems with the primary objectives of improving customer services, increasing revenue, containing costs and improving internal processes, in other words creating competitive advantage (Hildebrand, 1999). While not all of these systems are called KMS, their ultimate objective is to leverage best practices by capturing, storing, creating and disseminating organizational knowledge (Hildebrand, 1999).

Knowledge in SMEs

Small organizations are structured so that decision-making and reactions to change are rapid; Teece (2000) recognises that smaller entrepreneurial companies employ this strategy successfully. Duhan *et al.* (2001) identify the need for strategic planning enabling SMEs to respond to external environmental changes such as government policy. By building these capabilities, small companies may grow in spite of the unknown external influences that surround them. It has been suggested that since the early 1990s, US organizations have switched their strategic focus away from products and toward competitive advantage derived from the knowledge that their specialist employees can provide (Reich, 1991). Considering this in relation to SME size and ability to capture, store, disseminate and create knowledge the

effect of losing a staff members' tacit knowledge may be detrimental to an organization where no formal knowledge system is deployed. In addition to controlling and managing internal knowledge, the organization must consider controlling the flow of knowledge outside the organization and managing the transfer of context (Aadne *et al.*, 1996). A significant portion of the knowledge management literature concentrates on large multinational organizations. The significance of this research for SMEs is grounded in the reality that, like multinationals, have the ability to derive value from knowledge. While the researchers draw on knowledge management studies carried out in large organizations, they must realise that the issues faced by SMEs may not be a scaled down version of large business experiences (Sparrow, 2000). According to Penrose (1959), the differences between the administrative characteristic of very small and the very large firms are extensive making it difficult to draw similarities between the two, in other words a caterpillar may not be defined as a butterfly.

Organizations are in a situation where staff members are a key source of knowledge and the human resource department is effectively the knowledge management system for the business (Adam *et al.*, 2000). It has been suggested that since the early 1990s, American organizations have switched their strategic focus away from products and toward competitive advantage derived from the knowledge that their specialist employees can provide (Reich, 1991). Considering this in relation to SME size and ability to capture, store, disseminate and create knowledge, the effect of losing a staff members' tacit knowledge may be detrimental to an organization where no formal knowledge system is deployed. In addition to controlling and managing internal knowledge, the organization must consider controlling the flow of knowledge outside the organization and managing the transfer of context (Aadne *et al.*, 1996).

Identifying Organizational Knowledge

In order to identify how SMEs utilize IT to support their KM strategy, two key questions must be addressed, they include: (1) what is the knowledge and (2) where is it stored in the organization. The researchers draw on a number of the factors identified in Duffy's Conceptual Model of Knowledge Management (2000) that through effective use of knowledge management contribute to the effective capture, storage, dissemination and creation of knowledge. The researchers have created a matrix (Table 2) with the intention of identifying where the knowledge is located in an organization and how those knowledge repositories are affected by a number of influencing factors, in order to pursue an effective knowledge management strategy

of capturing, storing, disseminating and creating knowledge to generate a competitive advantage for the organization. This research intends to focus on exploiting knowledge to enhance customer and supplier relationships and to support/improve internal business processes.

Knowledge Repositories

As the researchers have discussed in previous sections, people are central to the KM strategy, it is their store of experiential knowledge that is of immense value to the organization as businesses seek to overcome 'knowledge leakage'. According to Duffy (1999, p100) smart people are "*the lynch pin of Knowledge Management*". The individuals working in the organization act as knowledge stores who have the ability to share and develop their knowledge contributing to the collective knowledge held in an organization's memory. In addition, organizational processes are acknowledged as fundamental organizational knowledge repositories (Kanevsky *et al.*, 1998). The knowledge embedded in a corporation's structure i.e. process, technology, people may be viewed as the valuable knowledge required for reproducing corporate products and services, for every final product or service generated by an organization, this series of processes using organizational knowledge significantly contributes to the final product (Kanevsky *et al.*, 1998).

Business processes have also been identified as the foundations for the knowledge organization; undoubtedly knowledge is embedded in the individuals (employees, customers and suppliers) involved in the organization and their daily interactions, the organization may be described "*as a network of intellectual and knowledge-based processes*" (Schuppel *et al.*, 1998, p224). According to Von Hippel (1988) an organization's suppliers and customers are its primary sources of ideas for innovations and enhanced knowledge transfer among these actors will out-innovate networks where knowledge sharing is under exploited. Quinn *et al.* (1998) support this view suggesting that some of the most valuable knowledge sharing comes from outside the organization in the form of supplier and customer interaction. Organizations deploy knowledge management strategies with the intent of developing business processes (Kautz & Nielsen, 2000). Teleska and Karagiannis (2002) identify business processes as the basis for a successful knowledge management strategy within an organization. They consider the key characteristics of knowledge management: acquisition, identification, generation, distribution as

knowledge process models focusing on the knowledge intensive tasks of the business processes, integrating knowledge into the activities of the employees.

Focusing on the organization as a knowledge repository, intelligent or learning organizations possess a memory. They comprise *“learning agents, discoveries, inventions and evaluations”* which are embedded into the organization (Argyris and Schon, 1978). Organizational memory allows the business to store past successes and failures (March, 1997). This knowledge store enhances employee knowledge and enables improved routines and practices in the future. While an organization itself does not remember, it is the memory of individuals. An organization’s memory store is comprised of the collective individual memories of the employees; therefore, it is important to maintain a low employee turnover, when an employee leaves the organization there is a negative effective on the organizational memory (Cohen *et al.*, 1990).

Finally, considering the knowledge stored in technological infrastructure, Cantoni *et al.* (2001, p671) state that *“the problem of explicating and transferring knowledge within an organization is more present in small companies in which a person usually could have different roles and bring more competences”*. Knowledge Management Systems (KMS) allow smaller organizations to overcome this barrier. Increasingly, technology referred to as KMS are utilized by organizations to store the explicit and tacit knowledge of the employees and of the organization as a whole. While controversial views surround the degree to which technology becomes an issue when implementing a KM strategy, IT remains a component of the knowledge environment as knowledge intensive organizations implement and develop leading edge technology platforms to support the knowledge requirements of the organization and its employees.

Influencing Factors

Research identifies an array of factors that are perceived to affect the development and the ultimate success or failure of KM in organizations. In this case, the researchers have identified from a cross section of literature, those factors that are believed to affect the development of knowledge repositories with the intention of mapping the relationship between the two elements. Firstly, Schein (1993) defines culture as the shared values, beliefs, and practices of the people in the organization. The design and development of the culture of the knowledge environment is a key determinant for how knowledge work is carried out in the community (Schein, 1996).

Organizational culture is particularly important with regard to changing employee attitudes and mindsets in order to encourage efficient knowledge sharing and re-use (Wastell, 2001). In order to stimulate successful KM practice the cultural aspect must be inherent to the employees (Storey and Barnet, 2000). For an organization to adopt a knowledge management strategy trust must be embedded into to the organization's culture.

The next factor that must be considered is IT. Technology plays an interesting role in the KM environment, it acts as both a repository for organizational knowledge but it also plays a part in directing the firm's KM strategy. Davenport and Prusak (1998) argue that the right technology acts as a catalyst in the movement of KM. Undoubtedly, the technology fit enhances KM effectiveness (Khalifia *et al.*, 2001). In order to grow a knowledge environment in an organizational setting, employees must be trained to articulate their knowledge and heighten their awareness regarding knowledge creation and dissemination. Employees must be able to understand and speak the language in which ideas are transferred in their work and additionally through training workers in the use of technology that will enable the capture, store, dissemination and search for knowledge (Cantoni *et al.*, 2001).

Additionally, business strategy has direct implications for knowledge management in any organization. Carlsson (2001) maintains that the strategic vision of an organization should encompass the mission of the firm, the future intent for the organization, the general objectives which may be decomposed into individual objectives and finally, a strategic knowledge management perspective for the business which is aligned with the organizational strategy, if knowledge is in fact identified as a critical resource for the organization in question. Organizational structure provides a custom built vehicle for effective knowledge transfer. Increasingly, organizations focus on transferring their employee knowledge through the organizational structure (Cantoni *et al.*, 2001).

Finally, in order to overcome the problems associated with "knowledge hoarding" it has become increasingly important that organizations provide a reward to encourage knowledge sharing (Davenport and Prusak, 1998). As Zuboff (1996) points out in the case of Piney Wood, "*explication means a loss of power*" to those operators who believed that their range of skills grew less significant as their activities became more increasingly explicit. This instinct is still prevalent in today's organizations as employees focus on creating a niche for their knowledge in

order to make themselves indispensable. This issue may be resolved by offering incentives or rewards can encourage employees to share their ideas and promote increased openness in an organizational environment (Cantoni *et al.*, 2001).

Table 2 identifies the knowledge repositories identified in the literature, additionally, the researchers have discussed the key factors that potentially influence each of these knowledge stores. The purpose of this matrix is to uncover where the knowledge is stored in small and medium organizations and how certain factors affect that knowledge repository through the process of knowledge management; capturing, storing, sharing and creating new knowledge.

Table 2: Knowledge Map- factors influencing organizational knowledge repositories

Repository /Influence	Culture	Technical	Training	Business Strategy	Incentives	Structure
<i>Employee</i>						
<i>Customer</i>						
<i>Supplier</i>						
<i>Business Process</i>						
<i>Technology</i>						
<i>Organization</i>						

Research Objective and Questions

The aim of this research focuses on IT as an enabler of knowledge management in SMEs. In order to meet this objective, the researchers propose two potential research questions. The first question focuses on SME's ability to successfully capture, store and disseminate organizational knowledge while the second delves deeper into the factors that actively participate in knowledge management with particular focus on IT's enabling role.

Question 1:

What strategies do SMEs employ to capture, store, disseminate and create both explicit and tacit knowledge?

- Is knowledge management a successful strategy for SMEs?
- Do knowledge management strategies for large organizations fit SMEs?

Question 2:

How do SMEs utilise IT to enable knowledge management?

- To support/improve internal business processes.
- To enhance supplier relationships.
- To improve customer relationships.

In the next section, the researchers discuss the research approach for this study and they identify how Table 2 will be populated.

Research Approach

This research study investigates the extent to which knowledge management is significant in small and medium sized enterprises and seeks to uncover how IT is leveraged to support this strategy. A qualitative, case-based approach is adopted for this study, Hill and McGowan (1999) support this strategy suggesting that small company research is optimised using a qualitative approach that includes participant observation, case studies and in-depth interviewing. In order to achieve the outlined objective, the researchers have derived a matrix (Table 2) identifying factors that exist in an organization's knowledge environment and how they affect the knowledge repositories in that environment. The researchers intend to pursue a strategy of purposeful sampling as a means of selecting information rich cases for this study (Patton, 1990). In this study, the cases identified focus on larger SME's with a staff of 90 plus. By doing this, the research is centred on small to medium organizations that have a fully developed structure and a significant IT function; the focal industries for this study include the software, electronics, manufacturing and service sectors.

As tacit knowledge is characterised by intuition, experience and perception, in many respects it is difficult to identify and codify in an organizational setting. Due to the intangible and dynamic nature of knowledge, the researchers propose to focus on how both tacit and explicit knowledge is captured, stored, disseminated, utilised and created in SMEs using a two-pronged approach, firstly through the analysis of decision making and secondly, by focusing on key organizational business processes. By focusing on decision making as the unit of analysis for this study, the key knowledge repositories for each decision will be identified in addition to the factors that affect that knowledge store. This will identify where the knowledge is stored and how it is utilized through the decision making process. It will also highlight how new knowledge is created

through implementing the decision and the feedback derived from the outcome of the decision, which in turn is captured and stored as new organizational knowledge. The researchers intend to examine a number of the key business process by breaking them down into sub-components as a means of identifying where the organizational knowledge is stored and how it is captured, disseminated and how new knowledge is created over time. This research aims to provide an insightful understanding of how knowledge is captured, stored, disseminated and created in small to medium sized organizations. The study's objectives include identifying valuable knowledge in SMEs and uncovering the extent to which IT is exploited to support an organization's knowledge environment.

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