OPERATIONALISATION OF KNOWLEDGE MANAGEMENT PRACTICES IN R&D ACTIVITY IN MULTINATIONAL ORGANISATIONS

*Sundeep Satyanarayan & Gideon Azumah
University of Central Lancashire
Lancashire Business School
Preston, PR1 2HE
Email: SSatyanarayan@uclan.ac.uk
Email: GAzumah@uclan.ac.uk

ABSTRACT

Both business and academic communities believe that by leveraging knowledge and managing it strategically, can sustain an organisation in its long-term competitive advantages (Nonaka, 1991). Using a case study and interview method, this research aims to explore what knowledge management and practices are and how to create, transfer and use it more effectively in MNO in the R&D sector. The research found that perception and understanding of the organisation’s tacit and explicit knowledge were keys to the competitiveness of the company. The importance of this research lies in the heart of it revealing and explaining not only does the environment receive explicit knowledge created by the organisation but how knowledge is applied and transferred.

Keywords: Knowledge Management, Explicit and Tacit Knowledge, Knowledge Transfer, Knowledge Sharing and Organisational Culture

INTRODUCTION

As a matter of debate, the past decade has witnessed the emergence of new R&D management practices that are more systematically designed and more attuned to corporate strategy. Roussel, Saad, and Erickson (1995) suggest that the only real product of R&D is knowledge. This means that knowledge must be managed in order to obtain competitive advantage.
Using a case study method to understand the importance of knowledge management in R&D organizations, an analysis was performed on available literature in this field to answer the basic question like ‘what is knowledge?’ followed by its properties and kinds of organizational knowledge – paradigmatic and narrative modes. The authors then move on to view knowledge as a resource explaining the two major kinds of knowledge – tacit knowledge and explicit knowledge. Once these two types of knowledge were explained, the authors introduce Nonaka and Takeuchi’s model for knowledge creation, explaining the famous SECI (Socialization, Externalization, Combination and Internalization processes) model. Also, the drawbacks of this model are explained, which could be one of the limitations of this research. This section is followed by explaining knowledge work. This involves the generation of knowledge (acquisition and creation), codification of knowledge and finally the transfer of knowledge. Knowledge management, its benefits and KM as a competitive advantage for a firm are explained in the following sections, moving on to the relationship between knowledge management and R&D.

The results give a brief insight into the company’s knowledge management history. Once this is explained, the actual analysis begins. This means that the authors analyze the company by investigating how the company perceives knowledge to be of importance. Then the company’s knowledge resource is analyzed focusing on the importance it gives to tacit and explicit knowledge. Then the following section envisages the organizations knowledge work, analyzing the generation of knowledge. In other terms, how the organisation acquires and creates knowledge; how knowledge is codified and eventually transferred internally and the findings out of the analysis. This is done by thematic coding and explaining the various themes.

The importance of this research lies in the heart of it revealing and explaining that not only does the environment receive explicit knowledge created by the organisation such as technologies, products or services, etc; but how knowledge to be brought into a new cycle of organisational knowledge creation how it is applied and transferred.
Perceived importance of knowledge

In recent years, many researchers have argued that knowledge and the capability to create and utilise it are the most important sources of a firm’s sustainable competitive advantage (Nonaka and Takeuchi, 1995). In a world where markets, products, technologies, competitors, regulations, and even entire societies change very rapidly, continuous innovation and knowledge that enables such innovation have become important sources of sustainable competitive advantage. Quinn (1992) agrees that the company’s competitive advantage increasingly depends on knowledge-based intangibles such as technological know-how and in-depth understanding of customers. However, despite all the attention that leading observers have devoted to organisational knowledge creation, and despite all the talk about intellectual capital and knowledge-based management, very few people understand how organisations create and manage knowledge (Dierkes, Antal, Child and Nonaka, 2003,) and more importantly in the R&D sector that this research is focusing on.

What is knowledge?

In their latest book ‘International business networks: tacit knowledge for competitive advantage’, Holden and Glisby (2009) state that, ‘knowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information.’ They argue that it originates and is applied in the minds of knowers. In short, knowledge is generated; it is codified and coordinated; it is transferred; it is, then, in principle used. The purpose of these knowledge generating processes explains Holden and Glisby (2009), is to serve the generator (for example, the scholar, who becomes more knowledgeable), the encoder or coordinator of knowledge (for example, an encyclopaedia), and the user (the person who consults the encyclopaedia) to extend or re-evaluate his or her existing knowledge.

Both business and academic communities believe that by leveraging knowledge, an organisation can sustain its long-term competitive advantages (Nonaka, 1991). Scholars and practitioners from various disciplines agree that knowledge is at center stage. This means that knowledge is information combined with experiences, circumstances, understanding, and manifestation that is ready to apply to decisions and actions. Although knowledge and
information may sometimes be difficult to distinguish, they both are important and entail human involvement. Hence it is not surprising that organizations everywhere are paying attention to knowledge as a key resource – exploring what it is and how to create, transfer and use it more effectively.

Properties of knowledge
As a matter of debate, Holden (2002, p. 66) states that while knowledge may elude formal definition to suit everyone, there can be less doubt as to the properties of knowledge:

a. Knowledge is, in a strict sense, only created by individuals.

b. It is perpetually expandable – even an interpretation of an inviolate text which is in the spirit if that text is an addition to knowledge.

c. It can be stored in human heads and in what we might call ‘technical repositories’ such as books, other documents, databases, data files and so forth.

d. It can be stored in a systematic way (for example, according to subject arranged in alphabetical order in encyclopaedias) to make it more accessible intellectually is retrievable from technical repositories.

e. It is often in the form of summary and part of the summarization process may include codification.

f. It can be shared: in principle, universally.

g. It can be forgotten and not used.

Kinds of organisational knowledge
As Nymark (2000) points out, there are two kinds of organizational knowledge. The first is the paradigmatic mode in organizational science and second – the narrative mode.

Paradigmatic mode:
This mode in organisational science, explains Nymark (2000) is attributed to the kind of research that has been called functionalistic in organizational analysis. It has a positivistic source and it is stimulated by a natural science research methodology. It is principally concerned with bringing to light general, universally true laws and targets context-free informal associations. It is an approach that is apposite for instance when investigating the
results collected through large-scale questionnaires. However it has little connotation when it comes to analyzing the outcomes of single case studies.

**Narrative mode**
This approach, explains Nymark (2000) can be acknowledged to a practice which is frequently referred to as the interpretive paradigm in organisation theory under which social constructivism is also found. In the narrative mode, research is oriented towards comprehensiveness and it is highly contextual. It is based on human action and intentionality. Thus a narrative mode of knowledge-creation is in focus when the concern is with regard to revealing principles in the organisational culture for the individual employee, and the diffusion of the organizational culture to new employees.

**Knowledge as a resource – Tacit and Explicit**
Holden (2002, p. 68) explains that it is possible to make major distinctions about the nature of knowledge. The most important distinction, states the authors is that which is made between knowledge which is *tacit* and knowledge which is *explicit*. Tacit knowledge is highly personal and hard to formalize. Polyani (1996, p.4) says ‘we can know more than we can tell’. Nonaka, Toyama and Byosiere (2003) suggest that subjective insights, intuitions and hunches fall into this category of knowledge. Cohen and Bacdayan (1994); Schon (1983); and Winter (1994) state that tacit knowledge is deeply rooted in action, procedures, routines, commitment, ideals, values, and emotions.

**Explicit Knowledge**
Explicit knowledge can be expressed in a formal and systematic language and can be shared in the form of data, scientific formulae, specifications, manuals, etc. It can be easily processed, transmitted and stored. Explicit knowledge is about past events or objects ‘there and then’, and it is oriented to a context-free theory. It is sequentially created by digital activity. According to Dierkes, Antal, Child and Nonaka (2003, p. 494), westerners tend to view knowledge as explicit. Japanese, on the other hand, tend to regard knowledge as primarily tacit. However, the authors argue that in reality, these two types of knowledge are complementary, and both are crucial to knowledge creation.
According to Nonaka and Takeuchi’s model (1995), there are four modes to knowledge conversion – Socialization (from tacit knowledge to tacit knowledge), Externalisation (from tacit knowledge to explicit knowledge), Combination (from explicit knowledge to explicit knowledge) and Internalization (from explicit knowledge to tacit knowledge). It is an ongoing process of knowledge flow and requires constant updating and sharing of knowledge. It starts with Socialization.

![Nonaka and Takeuchi’s model for knowledge creation.](image)

Source: Nonaka and Takeuchi, 1995, p. 71

**Knowledge work**

Holden (2002, p. 76) explains that knowledge work can be seen in terms of generation, codification and transfer of knowledge. However, these should not be seen as operationally discrete categories. He agrees with Collins’ (1998) argument that all of them overlap with the use of a personal knowledge base; the acquisition of new information; the combination, processing, production and communication of information; and the continuous learning from experiences.

**Generation of knowledge: Acquisition and Creation**

Burton-Jones (2000) state that the primary aspect of knowledge acquisition is that firms need a constant supply of knowledge inputs such as the selection and management of knowledge resources; they need to balance the supply of knowledge and demand; and the acquisition of knowledge of other firms. Holden (2002, p. 77) states that acquisition starts a variety of internal and external sources such as documentary resources that are printed, etc., computer databases, and interaction with other knowledgeable persons.
**Codification of knowledge**

Davenport and Prusak (1998) explain that the aim of codification is to put organisational knowledge into a form that makes it accessible to those who need it. They say that this process literally converts knowledge into code in order to make it organised, explicit and easily understandable. Holden (2002, p. 77) argues that codification is a problem, but not always a technical one. One method of doing this is to produce a knowledge map, which is used as a guide to the sources of knowledge that can be useful. Another method could be to involve the creation of a model.

**Transfer of knowledge**

Davenport and Prusak (1998) strongly suggest that the most effective and productive form of knowledge transfer is by face-to-face interactions. Researcher Dixon (2000) partially agrees with Davenport and Prusak (1998) that face-to-face meetings are the most effective form of knowledge transfer but also states that during her study, she noted that knowledge management systems can be designed with a combination of technology and face-to-face meetings. Holden (2002, p. 78) agrees with Collins (1998) that knowledge workers use a variety of information technologies to manipulate information such as electronic mails, groupware and information networks. These help knowledge workers to share information with individuals and/or groups. However, Holden (2002, p. 78) states that the challenges to transfer of knowledge are still very momentous. There are still issues of interdepartmental knowledge transfer and is also highly visible when it comes to geographical and cultural differences.

**Knowledge management**

Nonaka and Takeuchi (1995) state that knowledge management is a dazzling, multi-faceted, controversially discussed concept. Philosophers and representatives of a variety of different disciplines are debating the meaning, definitions, and dimensions of knowledge and knowledge management. According to Gordon and Grant (2004, pp. 28), some theorists have already suggested that the management of knowledge is not necessarily new. They state that Pemberton (1998) points out records have been kept for thousands of years before the emergence of philosophy and its focus on knowledge. In order to demonstrate his point, he goes back to the pre-Socratic times of the sixth and fifth centuries BC and discusses thinkers such as Anaximander, Pythagoras, Anaxagoras and Thales. In more recent times, scholars
trace the connection back to the writings of Frederick Taylor, the father of scientific management, but it is only in the last 20 years that knowledge management has come to the fore. Gates (1999) cited in (Call, 2005, pp.19) states that “Knowledge Management is nothing more than managing information flow, getting the right information to the people who need it so they can act on it quickly”.

Knowledge management as a competitive advantage

‘Knowledge’ is recognized as an important weapon for sustaining competitive advantage and many companies are beginning to manage organisational knowledge (Lee and Choi, 2003, pp. 179 - 228). Researchers have constantly investigated knowledge management factors such as enablers, processes, and performance to better understand this concept. Skyrme (2001, p. 1) argues that in just a few years, knowledge management has gone from consultants’ hype to an established management strategy. It has turned out to be more than just managing knowledge in databases; it is a critical feature of organisational learning.

Knowledge management and R&D

As a matter of debate, the past decade has witnessed the emergence of new R&D management practices that are more systematically designed and more attuned to corporate strategy. Roussel, Saad, and Erickson (1995) suggest that the only real product of R&D is knowledge. This makes the relationship between KM and R&D management inherently close, since R&D processes can primarily be seen as KM processes, transforming information on technological advancements and market demands into the knowledge needed for new product concepts and process designs.

According to Markides (1997), "Strategic innovations occur when a firm identifies and decides to fill the gaps in the industry positioning map (new customer segments; new customer needs; or new ways to produce, deliver, or distribute) and these gaps grow to become the new mass market". Hence, Parikh (2001) notes that innovations require conscious effort on the part of the firm. He says that firms must identify the gaps, search for new opportunities, continuously exchange information and knowledge, build on current knowledge bases, synthesize external knowledge with internal knowledge, and become a learning organization. Moenaert, Deschoolmeester, de Meyer, and Souder (1992) state that while
intuition plays a critical role in the early phase of innovation, efficient knowledge exchange among functions, internal and external to the firm is essential for success.

R&D divisions must develop specialist knowledge to provide insights into scientific and technological processes that enhance the value of products or improve production processes. However, Collinson (2001, pp. 339) argues that two related dilemmas occur – over the short term R&D must be able to assist in the overall commercialization of existing knowledge, i.e. it must leverage knowledge and expertise to solve immediate problems faced by business units (Coombs, 1996). Due to this nature of specialization, the problems or needs of each other for problem solving is difficult to identify. The solution, states Collinson (2001, pp. 339) lies in an effective interface that enables continuous integration of knowledge that directs the R&D specialists towards the problems and opportunities recognized by manufacturing specialists, market specialists or specialists dealing with customers, for instance. The interface must also provide these outside specialists with a clear understanding of what capabilities the R&D has to offer and how it can add value to the rest of the firm. The second dilemma, argues Collinson (2001, pp. 339) is that over the long term, R&D must develop knowledge and expertise that will provide competitive advantage in the context of anticipated technologies and markets. This means that the R&D must also be able to forecast future technologies and markets, and this knowledge must be integrated for strategic decision-making independently of the immediate demands of those serving current market needs (Collinson, 2001, pp. 339).
Figure 2.4: R&D knowledge in terms of Fleck's model. Adapted from Reva Burman Brown and Martin J. Woodland (1999, pp.180)

RESEARCH METHODOLOGY

3.1 Introduction
The authors used qualitative method of a case study with eight interviews in total with managers and engineers of the case company’s R&D department in this research to collect primary data. The reason why the author chooses this type of interviewing is because the authors wanted rich, detailed answers from the interviewees. This requires flexibility and freedom for the interviewee to ramble or go off at tangents so that the authors can pick out the most important information and use it in this research. With the informed consent of the interviewees, the interviews were recorded and the author also took down notes and
transcribed the interviews. The duration of the interviews ranged between forty minutes to one hour each. All primary data were accessed from the interviews conducted in the company. Primary data is qualitative in nature.

Secondary data which is also the final source of data was collected from the case company’s documents and archival records; and also published literature, which is from high quality academic books, journals, articles and from the internet in order to meet the aims and objectives of the research. The authors have taken care to use only reliable sources of information to ensure the research data is not contaminated with unsubstantiated work from unrecognized authors.

The authors used thematic coding to analyze the different forms of evidences collected during data collection. Further, charts, diagrams and graphs were also used to present data during data analysis.

**RESULTS, ANALYSIS AND DISCUSSIONS**

Using the guiding research questions and the interview transcripts, the authors established a list of codes that approximated the content of the words of the informants across all nine interviews. The authors viewed the process of thematic analysis as progressing through several levels of increasing abstraction. Coding represents the first level, when the researchers tried to capture the essence of an interviewee’s words. The authors found coding the most difficult task of analysis; it is the stage at which the ground is formed as the researchers walked on it. Once a code list was established, they were grouped into additional levels of abstraction. Throughout the process, the authors used the research question to direct and focus the emerging results.

**Emerging Themes**

Thematic analysis of the interviews revealed three dominant themes pertinent to the research question. The themes revolve around:

a. Cross culture
b. Communities of practice
c. Information technologies
1. Culture

During thematic analysis, the authors found cultural issues within the R&D department across international boundaries. During interviews, one issue that many managers pointed out was the issue with engineers in China in particular, having problems with sharing of knowledge among their employees on technical aspects of product development. Although this issue is not major and organisational culture of the company in Denmark is being taught and promoted in China, this could become a matter of concern in the long run. With the fast rate of development of the organisation in international countries, the case company sees this as an issue and plans to take up more steps to prevent cross cultural problems in the future.

Holden (2002, p. 3) argues that no internationally operating firm and its managers however experienced in international business can ever escape from the possibility of misjudgement, misinterpretation and mistakes in handling relationships with customers and suppliers. Nevertheless, culture is a problem area for management of international firms. This recognition of culture in the context of international business operations creates challenges and problems for firms and their management has given rise to a sub-discipline of international management studies called cross-cultural management (Holden, 2002). Cross cultural management, explains Holden is a branch of international management as an academic discipline which emerged in the 1960’s. In order to overcome the problems created by cultural differences, it is advised that emphasis may be given to networking and organisational learning.

Nonaka and Takeuchi (1995) state that an organisation’s internal diversity must match the variety and complexity of the environment in order to deal with the complexities of the external environment. This means that organisations must interact with the environment on equal terms (Holden, 2002, 98), creating a knowledge oriented concept of culture. Hence organisational learning creates the four modes of knowledge creation.

2. Information Technology

During thematic analysis, the authors found that the organisation is giving a lot of importance to information technology. Almost all interviewees mentioned that new software called ‘The case company wiki’ is under development where explicit information will be stored in a common database and will be accessible to all R&D employees of the organisation.
worldwide. The R&D staff will also be able to post questions and give suggestions to other employees who are unsure about certain technical data.

Also, virtual meetings and video conferences help in the sharing of tacit knowledge and knowledge creation. It is evident that computer-assisted communication technologies, particularly intra-organizational technologies provide the firm with information about markets, industries and suppliers. Huber (1990) states that organizational intelligence is likely to be more accurate, comprehensive and timely with the increased storage and acquisition of external information and the development of computer-enhanced organizational memories. They allow for better exploration of real problems and fuller generation of alternatives, activities often neglected because of a lack of time, suggests Huber (1982). Information technologies refer to the availability, level of investment in and usage of state-of-the-art computer-assisted communication technologies and decision-aid information technologies (Huber, 1990; Sethi and King, 1994; Kendall, 1997). Finally, the anonymity associated with general decision-aid information technologies allows users to participate freely in discussion without considering status and personality, thus alleviating common problems such as conformity of thought. The increased diversity of opinion often leads to generation of new knowledge (Robbins, 1997). Hence, it is clear that information technologies are positively correlated to the level of knowledge creation.

The analysis reveals that the information technology facilitates the processes of socialization, externalization, combination and internalization. All interviewees agreed that this database and virtual meetings and conferences create new knowledge. All knowledge stored in the database enables employee accessibility, which fulfills the combination process. Further, this database allows for future access enabling the internalization of knowledge within the R&D department worldwide. Hence, it is evident that tacit knowledge is converted into explicit knowledge and is communicated.

3. Community of practice

Another theme developed in this analysis is derived from partial extension of the information technology creating virtual, and face-to-face informal meetings called the community of practice. Employees of the R&D department were enthusiastic about the current features and functions of the community of practice. They said that community organizes annual seminars
and special chapter workshops each year to help socialize and develop community ethos. This, they said allows members to share knowledge not only through virtual contexts, but also have meetings for all employees to socialize and share knowledge with co-workers. In particular, communication between employees located in Denmark, Finland, India, China, etc. will be able to share their knowledge on this single virtual platform besides virtual conferences, etc. The analysis reveals that this community of practice facilitates the processes of socialization, externalization, combination and internalization. All interviewees agreed that interacting with other co-workers creates new knowledge. The virtual CoP holds a structured archive that contains all the discussions that take place. In the combination process, the archive of CoP makes it possible for members to access information over a period of time and benefits through the use of organization memory. This also enables for future workshops and meetings are easier to be conducted, creating new and broad topics. This also enables for events-promotion, courses, publications and stories that helps in the internalization of knowledge within the R&D department worldwide. Evidence also shows that individual’s tacit knowledge is transferred into explicit knowledge and is communicated.

The data indicates that these themes are important influencers of knowledge management and transfer. As would be expected, within the themes there is tremendous variability as to where compatibility and incompatibility exists and where opportunities exist for knowledge application.

**CONCLUSION AND RECOMMENDATIONS**

In order to meet the aim and objectives of this research, a detailed explanation of what knowledge management is was done. The authors explained the perceived importance of knowledge, answered the basic question of what knowledge is, discussing its properties and the kinds of organisational knowledge. Also, the two kinds of knowledge – tacit and explicit knowledge were discussed and were followed by knowledge work. Here, the generation of knowledge which included acquisition and creation of knowledge, the codification of knowledge and transfer of knowledge was discussed. After understanding these elements of organisational knowledge, the authors discussed knowledge management and the benefits of managing knowledge. Also, knowledge management as a competitive advantage and its link with research and development has been explained and demonstrated how it can be applied.
The case company’s perception of the importance of knowledge was analysed out of the interviews conducted and understanding of the organisation’s tacit and explicit knowledge was analysed. The company’s knowledge work and management of knowledge was then analysed out of the interviews. Finally, the challenges managers face with respect to knowledge sharing and transfer was studied and explained. The findings in this research shows that the three major themes – cross-culture, communities of practice and information technology. These three themes were closely studied and explained using Nonaka and Takeuchi’s model for knowledge creation.

It is seen that the themes emerged from this study show that any multinational organization, no matter how efficient it is in enabling transfer and sharing of knowledge, it must take into consideration the fact that no two countries operate in the same manner. Cultural differences are inevitable and managers and engineers involved in innovation working in a multicultural environment, need to understand that there are not only social cultural differences, but also more importantly, organizational cultural differences. As the case study throws light upon a single example of cultural differences between its head office in Denmark and its own branch office in China, it is clear that emphasis need to be given to networking and organizational learning. However, it is not limited to these two suggestions. Continuous improvement in the development of simple and clear means of enabling knowledge sharing and transfer is highlighted.

Further, as regards to Information technology, the case company uses state-of-the-art technology to ensure that knowledge is shared on a common database and is accessed to all R&D employees of the organization worldwide. However, not all organizations are able to invest huge amounts in technology and therefore, suggestions of an alternate means of knowledge sharing via the use of technology may be used such as open-source softwares available on the internet. But care must be taken to ensure data protection.

And as the final theme suggests, the development of communities-of-practice is essential of any multinational organization in order to allow employees oversees to be able to develop a more intimate working relationship that in turn benefits the organization in knowledge sharing. As the case study suggests, the communities of practice proved to be a good working environment and hence, may be applicable to other cases as well.

The results obtained in this research show that the themes emerged are important influences of the management of knowledge. As would be expected, within the themes there is tremendous variability as to where compatibility and incompatibility exists and where opportunities exist.
Therefore, this concludes the investigation in understanding the knowledge management practices of the case company to and meets the aim and objectives of this research.

REFERENCES


Roberts (2000). *Pick Employees Brains.* HR Magazine pp. 115-120
