

Knowledge Management in Small Firms

Jessada Panyasorn

University of Bath,
UK

Niki Panteli

University of Bath,
UK

Philip Powell

University of Bath,
UK

Abstract

This paper explores knowledge management in small and medium-sized firms (SMEs). It investigates the use of Lotus Notes in SMEs of a developing country as a counterpoint to the large firm, developed country emphasis of existing research. It develops taxonomy of Lotus Notes use within the context of different knowledge management processes; notably communicating, co-ordinating and collaborating. The study employs an interpretive approach using three case studies. The key findings suggest that publishing, searching, sharing and retrieving are the use modes for enabling sharing and storing information. Evidence of knowledge creation is found at the departmental level but not at the organizational level. Further, small firms may explore more groupware potential than large organizations and this reflects their different context. Finally, implications for further research are identified.

Introduction

Complex, competitive and dynamic business environments necessitate adaptive, flexible and responsive organizations. Accordingly, organizations are often compelled to invest in information technologies (IT) that enable access to a wider pool of resources and, in particular, knowledge sharing. A variety of information technologies have been designed and implemented to facilitate the management of knowledge including groupware (Arumn et al, 2008; Bellanger and Allport, 2008; Ciborra, 1996; Hayes, 2001) that supports communication, collaboration and co-ordination (Orlikowski, 1996). This paper investigates the use of Lotus Notes, a well-known groupware application. It advances the debate on the potential of groupware in knowledge management. It posits that although Lotus Notes is the focus of existing research, a paucity of studies exists about its use in relation to knowledge management in the context of small and medium-sized enterprises (SMEs) and none in developing countries.

The paper is structured as follows: first it reviews existing studies on Lotus Notes and identifies its uses for knowledge sharing. Then a framework of Lotus Notes use modes is developed which is examined within the context of specific organizations in Thailand.

Theoretical foundations

The use of Lotus Notes for knowledge management activities has been studied in a variety of organizations. Lotus Notes, a combination of document creator and indexer, database generator and manager, and messaging platform (Vandenbosch and Ginzberg, 1996), allows information to be distributed between different users in a structured or semi-structured way (Brown, 2000). Drawing upon the existing literature, this section presents the main functions of Lotus Notes in knowledge management. Nine major case studies discussing the use of Lotus Notes and its potential to knowledge management are reviewed. The selection of these cases is based on the rich descriptions of how Lotus Notes is implemented and used for facilitating information and knowledge management. Table 1 provides a synopsis of these studies taking account of the research site, the functions of Lotus Notes used, methods for collecting data and length of the study.

Seven cases are studied in large organizations, whereas the other two cases (Robertson et al., 2001; Karsten and Jones, 1998) are SMEs. The sectors are diversified, however, the main sector is consulting (Robertson et al., 2001; Orlikowski, 1993; Karsten and Jones, 1998). In terms of research approach, these studies employ in-depth cases in which interviews are the main method of data collection. The main identified benefit of using Lotus Notes is that shared information and knowledge on Lotus Notes can be accessed and retrieved by users regardless of time and location. Most studies find that factors embedded in the organizational context have a major influence on the successful use of Lotus Notes: collaborative culture (Orlikowski, 1993), incentive structure (Robertson et al., 2001; Orlikowski, 1993), homogeneous group (Hayes, 2001), management style (Karsten and Jones, 1998) and organizational dispersion (Ciborra and Suetens, 1996).

Table 1. Summary of the previous studies of Lotus Notes use

Study	Site and size	Lotus Notes functions	Method	Length
Robertson, Sorensen and Swan (2001)	Universal consulting: Medium	Email Discussion databases	Interviews Non-participant observation Documentation	Over 2 years (1996-Spring 1998)
Vandenbosch and Ginzberg (1996)	American insurance firm: Large	Lotus Notes databases	Interviews Surveys	Ten months (began after decision to expand use of Lotus Notes from 200 users to whole firm)
Orlikowski (1993)	Alpha: Large consulting firm: competitive culture	Electronic mail, discussion database, some databases for browsing	Unstructured interviews Documentation Participant observation	Five months (began prior to Lotus Notes installation)
Hayes (2001)	Compound UK: Large multinational pharmaceutical	Email Strategic selling databases Discussion databases Contact recording	Semi-structured interviews Informal discussions and interactions	Two-and-a-half year period (18 months after first Lotus Notes implementation)

書式変更: フォント : Verdana, フランス語 (フランス)

		databases		
Brown (2000)	Narajo: Large oil firm	Public forum databases: firm notice board and 'challenge' database Workflow database Tracking database	Participant observation Interviews	3 months (began after Lotus Notes implementation)
Ciborra and Suetens (1996)	EDF: Large, an international distribution part of a French energy provider	Email Discussion forum and databases such as world culture, news forum, expert databases.	Interviews	Over a year and a half (began after Lotus Notes was implemented)
Ciborra (1996)	Roche: Large Diagnostic division of multinational pharmaceutical	Cosis applications: multidisciplinary knowledge base	Interviews	Over 2 years (began after Lotus Notes was implemented)
Orlikowski (1996)	Zeta: Large software firm	Incident Tracking Support System Training database six firm-wide bulletin boards with electronic mail	Unstructured and semi-structured interviews. Non-participant observation Documentation	6 months (began two years after the ITSS developed on Lotus Notes.)
Karsten and Jones (1998)	CCC: Small computer consulting firm	Discussion and news databases, project databases	Participant observation Interviews Documentation	3 years (began prior to Lotus Notes implementation)

First, Lotus Notes is used to publish information. Published information is disseminated in different forms and for different purposes. For example, an interactive newsletter was published to disseminate news within an international department of the French energy provider *EDF* (Ciborra and Suetens, 1996). Technical documents were published and disseminated outside the customer support department of *Zeta* (Orlikowski, 1996). Meeting minutes were published to inform those not present in *CCC* (Karsten and Jones, 1998).

The second use mode of Lotus Notes is searching. Lotus Notes comprises capabilities such as full-text search and document indexer for searching or acquiring information. In *Universal consulting* (Robertson et al., 2001), project leaders used the indexing and search facilities of Lotus Notes to acquire specific information found in email and discussion databases. In *Zeta* (Orlikowski, 1996), the provision of a powerful search capability within the Incident Tracking Support System (ITSS), an application on Lotus Notes, allowed specialists to search their database quickly and easily for well-documented incident histories. Searching ITSS provided potentially

reusable problem resolutions as well as knowledge about problem-solving processes. Similarly, expertise in *Alpha* (Orlikowski, 1993) used Lotus Notes for organizational database browsing. Using Lotus Notes for searching information is also found in *EDF* (Ciborra and Suetens, 1996). Managers at *EDF* could search for others' experience of foreign cultures before they left for missions abroad.

The third use mode of Lotus Notes is retrieving. This mode focuses on using Lotus Notes to record and maintain a computer-based 'organizational memory' such as best practices, business process and frequently asked questions. For example, in *Compound UK* (Hayes, 2001), contact recording database enabled employees to record the views, interests and requirements of particular doctors that could be retrieved for future use. A training database in *Zeta* (Orlikowski, 1996) maintained sample problems extracted from the ITSS database which new hires worked with to try and resolve problems. Quality project documentation, which is a valuable by-product of using Lotus Notes for discussion on project work across countries, is maintained on the Lotus Notes databases of *Universal Consulting* (Robertson et al., 2001).

The fourth use mode is sharing. With this mode, individuals and groups in the organization use Lotus Notes to discuss and share ideas, experience, information and knowledge with each other. This use mode exists in all the cases, as Lotus Notes provides several mechanisms including email, discussion databases and public fora. In *American Insurance Company* (Vandenbosch and Ginzberg, 1996), geographically dispersed people participated in discussions about process change aimed at standardising the company's key activities across its regional divisions. Similarly, a strategic selling database was created in *Compound UK* (Hayes, 2001) to enable employees in different functions to input views and information in a structured way with the aim of bringing together their shared knowledge to facilitate a successful sale.

The final use mode of Lotus Notes is creating. This mode uses Lotus Notes to understand and create individuals' and groups' tacit knowledge. This mode is different from the other modes in that individuals' tacit knowledge is made explicit on Lotus Notes shared database. Others can use the shared knowledge database, as the tacit knowledge within groups allows them to understand the subtleties that underlie the meaning expressed on the shared database (Hayes, 2001). Hence, tacit knowledge is created in individuals' mind. However, the creating mode of Lotus Notes is likely to depend on the organizational context. For instance, within the same functions in *Compound UK*, employees could draw on their shared tacit knowledge to interpret skilfully and make judgements concerning the views recorded on the shared databases by members of their own functions (Hayes, 2001). On the other hand, the attempt to create a common knowledge pool for the global organization of *EDF* was not satisfied due to their misalignment to the virtual organization context with a highly dispersed structure and based on the strong competence and autonomy of agents and experts. As a result, it is difficult to reconcile the style of working and knowing with prescriptions to share information (Ciborra and Suetens, 1996).

In summary, Lotus Notes has been developed and used in different ways for supporting knowledge management activities. Table 2 synthesises these different use modes.

Table 2. Summary of use modes of Lotus Notes

Use Mode	Use Description	Source
Publishing	publishing information (e.g. newsletter, technical documents, product catalogues, employee directories).	Orlikowski (1996), Ciborra and Suetens (1996), Karsten and Jones (1998)
Searching	searching for or acquiring organization	Robertson et al.

	information (e.g. full text search capabilities, document indexer).	(2001), Orlikowski (1993, 1996), Ciborra and Suetens (1996)
Retrieving	recording and retrieving a computer-based 'organizational memory' (e.g. best practices, business process, frequently asked questions).	Robertson et al. (2001), Vandenbosch and Ginzberg (1996), Orlikowski (1993, 1996), Hayes (2001), Brown (2000), Ciborra and Suetens (1996), Ciborra (1996), Karsten and Jones (1998)
Sharing	discussing and sharing ideas, experience, information and knowledge with other individuals and groups in the organization (e.g. via Email, discussion databases, public fora).	Robertson et al. (2001), Vandenbosch and Ginzberg (1996), Orlikowski (1993), Hayes (2001), Brown (2000), Ciborra and Suetens (1996), Ciborra (1996), Karsten and Jones (1998)
Creating	understanding and creating individuals' and groups' tacit knowledge (e.g. shared databases within homogeneous group).	Hayes (2001)

Interaction richness model of use modes

This section develops the interaction richness model that taxonomises the use modes of Lotus Notes on two dimensions. The first dimension entails the types of interaction that may take place in a Lotus Notes environment, which may either be human-Notes interactions or human-human Notes-mediated interactions. The second dimension involves the types of knowledge management processes experienced in a Lotus Notes environment: coordination, communication and collaboration.

Coordination is regarded as the direction of individuals' efforts toward achieving common and explicitly recognised goals (Blau and Scott, 1963). The use modes that fall into the coordination category are 'searching' and 'publishing'. Searching leads to human-Notes interactive coordination process as people search for information and knowledge on databases in order to complete their individual tasks such as answering customers' enquiries. Publishing is concerned with human-human mediated interactive coordination since human uses Lotus Notes as an information sending channel to receivers, contributing to the exchange of knowledge.

The communication process emphasises the exchange of information between dispersed individuals and it mainly includes increasing connectivity, bandwidth and protocols for the exchange of many types of information such as text, graphics and voice (Ellis et al., 1991). 'Retrieving' and 'sharing' use modes can be put into this category. As the 'retrieving' use mode focuses on records of information and knowledge retrieved by users, databases act as agents that communicate the maintained information to individual receivers. Therefore, retrieving is regarded as the use mode stimulating human-Notes interactive communication process. On the other hand, the sharing mode emphasises the exchange of knowledge between individuals who are both senders and receivers, thus it is an exemplar of human-human mediated interactive communication process.

Finally, collaboration is a process of shared creation: two or more individuals with complementary skills interacting to create a shared understanding (Schrage, 1990). Thus, the fifth use mode of Lotus Notes, 'creating', belongs to the human-human mediated interactive collaboration process as it refers to understanding the shared knowledge database by drawing on individuals' shared tacit knowledge. From the existing literature, it is not possible to identify a use mode that belongs to the human-Notes interactive collaboration process. However, due to the interpretive flexibility embedded in information technology (Orlikowski, 1992) it is argued here that users will, over time, learn to explore further the potentials of Lotus Notes contributing to a collaboration between humans and technology where each benefits from the other. Thus, this study adds another use mode, 'exploring', wherein humans can consult and collaborate with Lotus Notes to enrich their knowledge.

	Coordination	Communication	Collaboration
Human-Human mediated interaction	Publishing	Sharing	Creating
Human-Notes interaction	Searching	Retrieving	Exploring

Fig. 1. Interaction richness model of Lotus Notes use modes

Knowledge management in SMEs

This study investigates how these use modes facilitate knowledge management in SMEs and whether and how the use modes relate to one another over time. Further, most studies on Lotus Notes focus on large organizations whereas the use of Lotus Notes in SMEs is neglected. This study, therefore, takes a step towards filling this void by focusing on the use of Lotus Notes as a knowledge management tool in the context of SMEs.

As with other aspects of business and management, the issue of knowledge management in SMEs may not be simply a scaled-down replica of large firm experiences (Sparrow, 2000). Some characteristics of SMEs lead to unique challenges in knowledge management. Within the constraints and opportunities afforded by their internal and external environment, SMEs need to develop knowledge management practices that address the knowledge needs of employees and organizational learning (Sparrow et al., 2000).

In addition, all the previous studies on Lotus Notes were carried out in developed countries. No study has examined the use of Lotus Notes or groupware in general within a developing country. As argued by Sahay and Avgerou (2002), the study of information systems in developing countries is important as it provides rich and meaningful problem domains resulting from the diversity in contexts, situations, work cultures and interests groups.

SMEs in developing countries need to respond effectively to customers' demands and keep up with the rapid changes occurring in the domestic and global markets in order to survive and compete with regional competitors (Abdullah, 2002; Brimble et al., 2002). This drives SMEs to manage their knowledge in order to improve their products and processes, provide customers with added value innovation and learning capabilities (Corso et al., 2001). As proposed by Sparrow (1999), SMEs with more advanced information systems such as Lotus Notes may be more committed to the principles of knowledge management and more willing to address knowledge management issues. As Lotus Notes enables employees to communicate, coordinate and collaborate within and across organizations, it may also provide opportunities to SMEs to manage their knowledge more effectively.

This research now investigates how Lotus Notes is used in supporting knowledge management activity within the context of a small firm in a developing country.

Research method

The interpretive epistemological approach is dominant in the nine studies (Table 1). The need for detailed understandings of human actions and meanings within specific contexts is emphasised while an in-depth case study approach is adopted in all. Accordingly, this study follows the interpretive approach (Walsham, 1993) as its focus lies on the subjective meanings that human actors ascribe to Lotus Notes technology in a specific context of SMEs located in a developing country.

The case method is the most appropriate approach here as it is a well-accepted approach to study the complex phenomena of technology implementation in an organizational setting (Alavi and Carlson, 1992). The specific research site and data collection methods adopted are discussed next.

Research site and data collection

As the main aim is to explore the use of Lotus Notes in SMEs in a developing country, Thailand is chosen as the research site. Thai SMEs are defined by the Ministry of Thai Industry (www.industry.go.th) as firms with less than 200 employees and with fixed assets of less than 200 million Thai Baht (€3.8m).

For the purpose of this study, three cases are selected; they are all IT consultancy firms, described as knowledge-intensive because they employ highly qualified technologists and rely heavily on the integration and synthesis of their specialist knowledge to create novel products and processes in response to clients' problems (Robertson et al., 2001).

The data collection took place within the companies: ComNotes, Procom and Comtech (pseudonyms) and a variety of qualitative data collection methods were used: interviews, review of firm industry and project documentation, and non-participant observation. The fieldwork took seven months. In total, the study involved semi-structured interviews with 33 key people across different organizational layers, including the CEO, sales & marketing director, sales assistant manager, system administration supervisor, technical development supervisor, customer services manager and customer services supervisor from the three companies. Each interview lasted 45-60 minutes. Most of the interviews were recorded, transcribed and then translated into English. Manuals of Lotus Notes applications and marketing promotion materials such as brochures and posters were collected. Further, informal conversations and discussions with the interviewees and other staff members in the company were conducted during each visit in ComNotes. Observations of how members use Notes were made so as to provide further insights into the functions of Lotus Notes applications.

Company background

ComNotes

ComNotes's aim is to assist the customers to improve their productivity, efficiency and organizational effectiveness through the use of productivity-driven applications e.g. Customer Relationship Management (CRM), Human Resources Management (HRM), call centre, e-procurement, and document management.

ComNotes structure involves three departments, including sales & marketing department, technical support department, and customer services department. The

sales & marketing department is responsible for understanding customers' requirements and retrieving customers' satisfaction. The technical support department integrates two responsibilities - system administration and development. The role of system administration is to implement the system and settings for its customer at the first instance, while development is involved with application design and maintenance. The customer services department is responsible for after-sales services and receiving calls from customers.

Procom

Procom provides hardware, software and integration services for manufacturing, finance and securities trading, and education. Procom supports a wide range of software products to help customers implement IT infrastructure. It offers solutions such as Lotus Notes for communication and document management; Cognos for business intelligence solutions; and LANSA for application development. Procom's hardware and software offerings are complemented by a complete range of services. Services such as installation and setup of software and hardware, network cabling, and configuration are bolstered by a complete range of educational services for advanced systems.

Procom employs forty staff members. The company is divided into two main departments, Operations and Sales & Marketing. The Operations department comprises of Systems Engineering and Technical Support, Purchasing and Administration, Presale and Support and OA products. The Sales & Marketing department includes Presale and Support, hardware and software Sales and Administration. Responsibility of the Operations department is to implement solutions for customers and support customers after implementation, whereas the Sales & Marketing department promotes products and services and acquires customer requirements.

Comtech

Comtech is a software business set up to serve comprehensive infrastructure technology solutions for online businesses. For its consulting services, Comtech develops solutions for different industries and work processes. Its main clients range from small to large enterprises, and financial institutions. Comtech employs around fifty staff members performing three main functions: Sales & Marketing, Infrastructure and Developers. Infrastructure is responsible for network and anti-virus software. The Infrastructure team is divided into four sub-teams - Operating System (OS), Network, Application, and Support and Maintenance (Support & MA). The team of OS, Network and Application focus on implementation systems for customers, whereas Support & MA tracks and supports customers after implementation. The Developers team is responsible for developing Notes applications on and for other IBM products such as web portals. The Infrastructure and Developers teams also work as a support team including both pre-sale and after-sale services. The Sales & Marketing team is responsible for promoting products and services, and obtaining customers' requirements.

Lotus Notes has been implemented in all three cases. In general, users are authorised to access and shared the same resources in most of the databases. However, some applications were designed to meet the needs of different departments.

Findings

Uses of Lotus Notes

This section focuses on the concept of the six use modes identified in the interaction richness model and the case material in order to investigate how the use modes facilitate knowledge management in SMEs and how the use modes relate to one another over time. In particular, what follows explores the role of Lotus Notes applications used in the three case studies for coordination, communication and collaboration.

Coordination

Coordination appears to be the main knowledge management process in the three cases. With the email feature of Notes, all employees can add a document link to any database. With regards to the interaction richness model, this may be considered as publishing use mode as the senders would like someone to be informed or to be instructed to do something. As the director of ComNotes explained:

"...people live with their email...Lotus Notes is very good in that you can automatically generate documents that get emails to people and within those documents there are the links [that would enable them to access additional information]".

"...[for example] this email. It's an order required approval on 9th January. There is a doc link on that. I click on that and it opens up the e-procurement system. So, I can see all the information about this sale....That's everything I need to know so I'm happy with that. So, I click on approval. I can even enter any comments and now notification has been sent to the accounts department for them to issue the purchase order".

"There are few people who post knowledge to this database. So we should have read it. It has sometimes been sent to me by mail. When people post it to databases, there will be a message alert. We check emails everyday, so we should have come across this knowledge." (Software consultant, Procom)

In addition, the information on the customer contact database was made available to everyone in Comtech in order to contact customers:

"I mainly use Notes for customer databases. I always lose name cards of people so I post them on knowledge management database...It facilitates searching. When there are many people to be contacted, it is a single point for everyone to see. It helps everyone to find contact details of the customers." (Sale staff)

Searching is another use mode of the coordination process. Users can acquire important documents maintained in Notes by using the search function enabling access to a wide range of information posted by different people. The sales director explained:

"What we correspond everyday is a kind of knowledge. Knowledge is embedded in emails. It is being kept systematically. If we want to refer to what we have mentioned, we search for that email. This is a kind of searching for knowledge".

Moreover, the search facility is used for locating expertise:

"We have a human resource application to keep employee's profile and history. Lotus Notes is very good at searching. We use this function. For example, I want to search for a person good at technical skills and tennis. I can search on this application rather than looking it up from paper documents by myself. This is expertise location. It's also a type of knowledge management. So, we can put the right man on the right job in our company"

Similarly, members of Comtech also used an application to search for customers' contact details. Therefore, individuals used Notes to search for, and co-ordinate themselves with the right people they need to contact:

"...There is a record of customer list; company A,B,C... In company A,B,C record, it preserves the contacted person's name...What is his responsibility? Is he a decision maker or an IT manager? It's a database of our customers..." (sales staff)

It was noted that even if everyone knows each other due to the small size of the company, the dynamic and knowledge intensive nature of business, drives the company's need for such a tool. This is because different projects require different skills of people and it needs a record of profiles to refer to. Therefore, this facility is as important for small firms as it is for large ones.

In Procom, Notes was used as a search tool for solutions which were kept on the databases, i.e. to find out if the same problems had been faced before:

"...if the customers asked for problems that we experienced. For example, the server is down...the support people will open the database called knowledge management database...look up the software, hardware index which have been maintained. They will look up for the keyword..." (Software consultant manager)

Communication

Lotus Notes was utilised as the main mechanism for communication in ComNotes. As the system was widely employed throughout the company, it was particularly noted that: *"It is very convenient for human to human communication"* (technical development supervisor).

The 'sharing' use mode of communication process takes place when human uses Lotus Notes applications to correspond to each other and this was evident in the case studies. Discussion databases are used to share knowledge within the technical support department of ComNotes:

"When we receive calls from customers, we will keep it in call log (an application of Lotus Notes). It will identify different problems of the customers...I can choose whom I want to send the complaints to. When they receive my email, they will make comments and ...I can [then] send it to the customers for approval". (Customer services manager, ComNotes)

Similarly, in Procom, new information or solutions were shared on databases when the users could not find existing solutions to problems when searching:

"If they don't find the keyword, they will put a new topic. But they will ask others for solutions. If it is solved, the solution will be maintained. If not, the solution will be kept pending and asked for from the others later... If the solution has been kept, they can use it because mostly they will keep the solutions..." (Software consultant manager. Procom)

In Comtech, the information posted onto the KM database may have been found from external resources such as the Internet, which the person who found it deemed appropriate to share with others. As a result, several people can retrieve and use such information and knowledge:

"The documentation is useful for the next customers because when we get requirements from customers, there will be many systems. However, most systems are similar. We can see from the knowledge management database whether there has been a similar application so that we can modify it for another customer. Some codes can be applied to new applications." (Developer, Comtech)

However, the sharing mode is often bound within one department as the information may not be related to other departments and access to some databases is limited to the relevant department.

Further, the 'retrieving' use mode implies the use of Lotus Notes applications to retrieve information and knowledge from databases. Retrieving refers to the use mode that Notes is used to acquire a computer-based 'organizational memory' such as best practices, business processes and frequently asked questions where users can retrieve them. The Customer Services supervisor of ComNotes explained that:

"I keep my presentation file in the discussion database. Anyone can access it.. and use at his disposal".

In Procom, the Notes databases were used as a shared space since they were used to maintain different information in different departments. This information was useful for colleagues to follow up work in progress, and to learn from others' experience:

"...if someone went to meet customers, it will appear in the service record. He will type in whether the problems have been solved or whether they continue. For example, there is sales tracking in Marketing. This is to show who are our prospective customers. We can follow if the sale is successful or the potential to close the sale... We keep it, for the new salespersons to follow rather than start learning again" (Software consultant manager)

Furthermore, for the Developers team of Comtech, the KM database was used to retrieve technical knowledge such as programming codes:

"...I have found (programming) codes from somewhere, I can post on the databases in order to be used for the next time...No one can remember all the codes...we have to retrieve them from the previous codes..." (Developer)

Collaboration

Collaboration entails the process by which two or more individuals create a shared understanding of what has been maintained on databases. The 'creating' use mode is understood by drawing on individuals' shared tacit knowledge as was found in the case of ComNotes. Though, Lotus Notes was used for information sharing throughout ComNotes, shared understanding remained limited due to specific knowledge held by individuals in different departments. For example, the technical support department has their own language to describe problems and solutions or technical language that can be created on Lotus Notes databases, whereas other departments used Lotus Notes to maintain information required for day-to-day operations. The customer services manager noted that:

"In the technical support department, they have their own knowledge because they have solutions which are linked to programming codes. In my department, we keep only requirements from customers. They're just information. It's required for our day-to-day work. Knowledge will be used to do that work. Knowledge is any 'how to' [For example] our knowledge would be how to write a report or how to respond to mail...We do not have online documents for this. We prefer face-to-face meetings to transfer this knowledge".

The KM database of Notes helped individual staff create their personal knowledge or skill in carrying out a task in Comtech:

"At least I know what we have to prepare. It's very useful for new-comers. When I was new, I didn't have to ask much from others. I can study from those files how to do this and that. How we should carry out ours" (Sales staff, Comtech)

However, knowledge creation was limited within this same department. Notes databases were particularly designed to support operations within the technical department:

"...Knowledge for support is more apparent because it can be shared and in the same department or across department the databases can be used to support or solve problems for customers..." (Software consultant manager, Procom)

"Everyone is allowed to read our knowledge base... However, if they're not involved in the job, they won't read it. There are thousands of records. No one will see all the department databases. So, we mainly use our own department's databases" (System administration supervisor, ComNotes).

This implies that though some knowledge is widely accessible, individuals may not make use of it.

In addition to the five use modes of Notes identified in the literature, a sixth use mode 'exploring' was identified. Exploring is the use mode of Lotus Notes that could develop further the collaboration between users and technology to the point where each benefits from the other. This means Lotus Notes may act as a consultant that helps users to achieve a common goal. There is evidence of this in ComNotes. The decision was taken to link a new communication tool, SameTime, to Notes to improve collaboration using synchronous communication across different departments and organizations in ComNotes. SameTime, an e-messaging application of IBM that enables synchronous communication another IBM product, was used to complement Lotus Notes and enable communication between company's employees in the Head office and a branch in Cambodia. Accordingly, SameTime in the case study was not merely a tool that enabled sharing of knowledge but also a tool that further explored the potentialities of Notes for efficient intra- and inter-organizational communication.

In addition, the web portal was linked to Notes databases and applications in order for travelling staff members to access their applications on Notes from other locations and retrieve the information on databases. The use of Notes, therefore, tended to be integrated with other systems that facilitated users in exploiting Notes features even if they worked remotely:

"SameTime is mostly utilised across departments. Within the department, we prefer face-to-face meetings as we are in the same place...We're sometimes at customer's site or abroad. Someone might ask us through SameTime about technical problems. So, we tell them the solutions or techniques through SameTime. We act as both inquirer and solving persons...We also keep the solutions on Notes databases". (Technical Development supervisor)

Comtech also planned to use a new system 'workplace' in the future instead of Notes. Workplace allows users to access the same application of Notes through the website:

"If we use 'workplace' application, we will access databases through website. There won't be license fees. The website could be used instead of Notes client." (Support & MA staff)

Hence, by integrating other systems in order to explore the further potential of Notes, it would provide better collaboration between users and IT for KM.

Discussion

This section discusses the use of Notes as a KM tool within the context of SMEs. It was found that even though the system was not implemented in the organizations studied as part of their strategy for KM, it provided facilitation for KM activities. The creation of new knowledge also occurred through accidental rather than planned combinations and exchanges, reflecting emergent patterns of accessibility to knowledge and knowledge processes (Nahapiet and Ghoshal, 1998). As explained by Grover and Davenport (2001) emergent KM processes are tied into the work processes themselves, which may not be visible to participants. In Procom where Notes was not recognized as a tool to support for KM, the findings show that, to some extent, Notes supports KM activities through human actions that the staff pursues on Notes. This is because Notes was implemented in these organizations in order to improve co-operation in their business processes, whilst the concept of intentionality (Giddens, 1984) is an influence on social action in which the staff acknowledges as possibilities that outcomes may turn out to be different from those anticipated. Similarly, Orlikowski (1996) contended that the use of Notes leads to changes that are enacted both intentionally and opportunistically and are accompanied by some unanticipated consequences. Deliberate KM processes (Grover and Davenport, 2001) occur in ComNotes and Procom since the organizations are better aware of KM initiatives than Comtech.

Having found that KM is either an emergent or deliberate outcome of Notes use, the discussions on the question as to whether knowledge is processed through Notes are in line with much literature which has argued that technology in itself lacks the capability of KM (e.g. Sherif et al., 2004; Galliers and Newell, 2003; McDermott, 1999; Walsham, 2001; Wilson, 2002). However, based on the existing literature on Notes, this study conceptualized the use modes of Notes explaining the relationship between the human interaction processes with IT and knowledge as a result of the interactions. The first four use modes of Notes, including publishing, searching, sharing and maintaining are not only used in order to manage information, they are also enablers to the creation of knowledge of organizational members and hence lead to the other two features of Notes, 'creating' and 'exploring' use modes. This is because information is important in providing a basis for action (Coleman, 1988).

Having said that knowledge is not an object which resides in such technology as Notes, this study contends that Notes supports human actions in relation to the KM activities where knowledge of individual can be exploited and knowing or know how emerges from human actions in a particular context (Sambamurthy and Subramani, 2005). The 'Creating' use mode was utilized by the staff to create their tacit knowledge in order to work for organizations. However, the attempt to utilize 'exploring' use mode was not sufficiently manifested in the case studies. This may be because the organizations studied still lack speciality in KM practice which they have to realize that "without the ability to seamlessly collect, index, store and distribute explicit knowledge electronically whenever and wherever needed, an organization will not fully exploit its capabilities and incentives" (Zack, 1999, p.55). Therefore, they might not put in much effort to explore and develop the use of Notes for KM. Next, the paper explores the SMEs context in which Notes was implemented and contrasts this to that of large organizations.

SMEs and large organizations

In comparing large and SME organizations, several factors deriving from the context of SMEs are found to influence the use of Notes for KM. First, Notes is more likely to be used as a tool to build relationship among the staff in large companies. In other words, Notes impacts the pre-existing formative context questioning the hierarchical structure and the functional division of labour (Ciborra and Patriotta, 1996). For example, the use of Notes in Compound UK (Hayes and Walsham, 2001a), Unilever (Ciborra and Patriotta, 1996), Roche (Ciborra, 1996) and Alpha (Orlikowski, 1993) facilitated work across boundaries which allowed staff an

increased familiarity with individual personalities, as well as opening up a forum of discussion surrounding the assumptions and perspectives of experts from different functions (Hayes and Walsham, 2001a). In large organizations Notes may be used to bridge the gap of time and space in connecting several people together and this could lead to the obstacles in co-operation on Notes since the norms for co-operation are limited prior to the implementation of Notes. Similarly, Ciborra (1996) found that no one fully trusted the databases in a large pharmaceutical company which relates to the traditional problems that plague inter-functional, centralized databases in large, bureaucratic organizations.

Unlike large companies, this study found that, due to the close relationship in SMEs between the staff, such interpersonal relationships are likely to drive them to interact through Notes. Hence, the size of organizations in which Notes is implemented is found to have an influence on the use of Notes for KM. This may be because the smaller organizational context allows more opportunities for staff to collectively learn and foster joint understanding and expectations. As argued by Orlikowski (1993), since individuals are used to personal computing environments, shared technology use is difficult to grasp in large organizations. This could inhibit the learning on how to use Notes in large organizations which results in less co-operation on Notes than in a smaller firm context. In addition, in large organizations such as Compound UK, many employees were not confident that they could make their views on a particular issue clear on the databases, and feared offending others or writing something stupid or irrelevant to other employees (Hayes and Walsham, 2001a). In contrast, this is not an issue in the cases of SMEs here. This may be because the size of the organizations in which everyone knows each other engender a friendly environment for sharing ideas and opinions. Further, the relationships among the people in ComNotes and Comtech are likely to motivate the members to interact with each other through Notes. The organization size also helps in forming in-depth relationships between staff in different departments and functions. This happens through working together and other means such as meeting around break periods as the staff are all located in the same place.

However, not only does the size of organization enable the use of Notes for co-operation, but the use of Notes, on the other hand, is also found to enhance the co-operation among the staff in small organizations. This is because staff members are likely to be away from their office and Notes acts as a medium in their co-operation. As found by Karsten and Jones (1998), a small computer consultancy company employed Notes to increase co-operation among individual consultants which previously appeared to be decentralized, with each consultant pursuing their own approach. Similarly, staff in ComNotes, Procom and Comtech are likely to use Notes to increase participation on co-operation when they work remotely. It also enables a more centralized form of organizational structure where the top management can control their staff who are always away. Further, the findings of this study are consistent with Karsten and Jones (1998) in that Notes supports horizontal and vertical co-operation. For example, the staff can use Notes for horizontal co-operation for joint projects where different departments are needed. Notes is also used for vertical co-operation by providing a history of work that the staff can consult if a project had to be transferred to another consultant.

Notes appears to be an appropriate tool for KM in a developing country such as Thailand, since it uses email as the main mechanism in the various co-operation processes. Emails require less bandwidth per user, which is a welcome feature in developing countries where bandwidth is often limited (Wagner et al., 2003). Hence, staff members do not need to send large-size files, which contain enormous knowledge to others as they can be maintained in several forms such as pictures on the central server which is directed by emails. However, the inscriptions of Western values in technology may also negatively influence the adoption of IS in a developing country (Walsham and Sahay, 1999). This is because there is the gap between the

assumptions inscribed in the technologies developed in the context of industrialized countries and the prevailing way and state of organizational life in the countries to which the technologies were being transferred (Sahay and Avgerou, 2002). Similar to the GIS technology studied by Walsham and Sahay (1999), Notes may embed the assumption of coordinated action in the developed country. For example, the workflow capability of Notes enables the user to co-ordinate with several departments throughout organizations. However, the findings of this study appeared that Notes is mostly utilized as a specific tool for each department. This may be because of the rigid functionality and uncoordinated action (Walsham and Sahay, 1999) that tend to occur in Thai organizations. Staff members do not use Notes to interact with people in other departments. Hence, the use of Notes to co-operate between different people in Thai organizations is limited.

Conclusions and Implications

This paper has investigated the potential of Lotus Notes as a knowledge management tool in three SMEs in Thailand. Its aim was to explore Notes use in a developing country SME as a counterpoint to the large firm, developed country emphasis of existing research. It has developed a taxonomy of Lotus Notes use within the context of different knowledge management processes using the cases of three IT consultancy firms.

Future studies of groupware use in other types of consultancy firms or knowledge intensive firms, which are situated in a SME in a developing country, are needed for a greater and deeper understanding of how Notes supports KM in this specific context. As this study was carried out in IT, it would set out the practical use of Notes in other industries. However, a detailed understanding of a specific organizational context cannot be neglected in order to bring a successful implementation of groupware for KM. Hence, another implication for further research is due to the limited degree of generalization. As the focus is the use of Notes in SMEs, researchers may conduct additional research in other industries apart from IT. Future research may also investigate other collaborative tools whether and to what extent it can be used to support KM in developing country SMEs. This would help to increase generalizability of the interaction richness model and to clarify more potentials of each use mode in relation to KM presented in this study. Research may compare the use of such collaborative tools or other groupware to Notes to see if it leads to more or less efficiency of KM in developing country SME contexts.

References

- Abdullah, M. (2002). An overview of the macroeconomic contribution of SMEs in Malaysia. In C. Harvie, & B.C. Lee (Eds.), *The role of SMEs in national economies in East Asia: Studies of small and medium sized enterprises in East Asia Volume II*. Edward Elgar: Cheltenham, UK.
- Aurum, A., Daneshgar F. and Ward, J. (2008), Investigating knowledge Management practices in software development organisations – An Australian Experience, *Information and Software Technology*, 50, 6, 511-533
- Alavi, M., & Carlson, P. (1992). A review of MIS research and disciplinary development. *Journal of Management Information Systems*, 8 (4), 45-62.
- Belanger F and Allport, C.D. (2008), Collaborative Technologies in Knowledge telework: an exploratory study, *Information Systems Journal*, 18, 1, 101-121
- Blau, P., & Scott, W. R. (1963). *Formal organizations: A comparative approach*. London: Routledge & Kegan Paul Ltd.

- Brimble, P., Oldfield, D., & Monsakul, M. (2002). Policies for SME recovery in Thailand. In C. Harvie, & B. C. Lee (Eds.), *The role of SMEs in national economies in East Asia: Studies of small and medium sized enterprises in East Asia Volume II*. Cheltenham: Edward Elgar.
- Brown, B. (2000). The artful of groupware: an ethnographic study of how Lotus Notes is used in practice. *Behaviour & Information Technology*, 19 (4), 263-273.
- Ciborra, C. U. (1996). Mission critical: Challenges for groupware in a pharmaceutical company. In C. U. Ciborra (Ed.), *Groupware and teamwork: Invisible aid or technical hindrance?*. Chichester: John Wiley & Sons.
- Ciborra, C. U., & Patriotta, G. (1996). Groupware and teamwork in new product development: The case of a consumer goods multinational. In C. U. Ciborra (Ed.), *Groupware and teamwork: Invisible aid or technical hindrance?* Chichester, England: John Wiley & Sons Ltd.
- Ciborra, C. U., & Suetens, N. T. (1996). Groupware for an emerging virtual organization. In C. U. Ciborra (Ed.), *Groupware and teamwork: Invisible aid or technical hindrance?* Chichester: John Wiley & Sons.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94: 95-120.
- Corso, M., Martini, A., Paolucci, E., & Pellegrini, L. (2001). Information and communication technologies in product innovation within SMEs-The role of product complexity. *Enterprise and Innovation Management Studies*, 2 (1), 35-48.
- Ellis, C. A., Gibbs, S. J., & Rein, G. L. (1991). Groupware: some issues and experiences. *Communications of the ACM*, 34 (1), 38-58.
- Galliers, R. D., & Newell, S. (2003). Back to the future: from knowledge management to the management of information and data. *Information Systems and e-Business Management*, 1: 1-9.
- Giddens, A. (1984). *The constitution of society*. Oxford: Polity Press.
- Grover, V., & Davenport, T.H. (2001). General perspectives on knowledge management: Fostering a research agenda. *Journal of Management Information Systems*, 18(1): 5-21.
- Hayes, N. (2001). Boundless and bounded interactions in the knowledge work process: the role of groupware technologies. *Information and Organization*, 11, 79-101.
- Hayes, N., & Walsham, G. (2001). Participation in groupware-mediated communities of practise: a socio-political analysis of knowledge working. *Information and Organization*, 11: 263-288.
- Karsten, H., & Jones, M. (1998). The long and winding road: Collaborative IT and organisational change. In *Proceedings of the CSCW'98*, Seattle, USA.
- McDermott, R. (1999). Why information technology inspired but cannot deliver knowledge management. *California Management Review*, 41(4): 103-117.
- Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23(2): 242-266.

- Orlikowski, W. J. (1992). The duality of technology: rethinking the concept of technology in organizations. *Organization Science*, 5 (3), 398-427.
- Orlikowski, W. J. (1993). Learning from Notes: Organizational issues in groupware implementation. *The Information Society*, 9 (3), 237-250.
- Orlikowski, W. J. (1996). Evolving with Notes: Organizational change around groupware technology. In C. U. Ciborra (Ed.), *Groupware and teamwork: Invisible aid or technical hindrance?* Chichester :John Wiley & Sons.
- Robertson, M., Sorensen, C., & Swan, J. (2001). Survival of the leanest: Intensive knowledge work and groupware adaptation. *Information Technology & People*, 14 (4), 334-353.
- Sahay, S., & Avgerou, C. (2002). Introducing the special issue on information and communication technologies in developing countries. *The Information Society*, 18, 73-76.
- Sambamurthy, V., & Subramani, M. (2005). Special issue on information technologies and knowledge management. *MIS Quarterly*, 29(1): 1-7.
- Schrage, M. (1990). *Shared minds*. New York: Random House.
- Sherif, K., Hoffman, J., & Wetherbe, J. (2004). *Can technology build organizational social capital: The case of a global IT consulting firm*. Paper presented at the tenth Americas Conference on Information Systems, New York.
- Sparrow, J. (1999). *Supporting knowledge management in small and medium sized enterprises*. Birmingham: Knowledge Management Centre.
- Sparrow, J. (2000). *Knowledge features of small firms*. Birmingham: Knowledge Management Centre.
- Sparrow, J., Matlay, H., & Bushell, M. (2000). Knowledge management: The challenge for small business support. Birmingham: Knowledge Management Centre.
- Vandenbosch, B., & Ginzberg, M. J. (1996). Lotus Notes and collaboration: Plus ca change. *Journal of Management Information Systems*, 13 (3), 65-81.
- Wagner, C., Cheung, K., Lee, F., & Ip, R. (2003). Enhancing e-government in developing countries: Managing knowledge through virtual communities. *The Electronic Journal on Information Systems in Developing Countries*, 14(4): 1-20.
- Walsham, G. (2001). Knowledge management : The benefits and limitations of computer systems. *European Management Journal*, 19(6): 599-608.
- Walsham, G., & Sahay, S. (1999). GIS for district-level administration in India: Problems and opportunities. *MIS Quarterly*, 23(1): 39-66.
- Wilson, T. D. (2002). The nonsense of knowledge management. *Information Research*, 8(1).
- Zack, M. H. (1999). Managing codified knowledge. *Sloan Management Review*, 40(4): 45-58.

