

Knowledge Management for Small Medium Enterprise: Capturing and Communicating Learning and Experiences

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ABSTRACT: With the increasing pressure for competitiveness on the construction organisations, it is necessary to capture, transfer and reuse project knowledge and use lessons learned from previous projects to improve project performance. Much of construction work is project-based, short-term and task-oriented; promoting a culture where continuous learning is inhibited. Specialist and technical knowledge is lost for one project to the next and arguably stifling an organisation's ability to develop knowledge and generate new ideas. In this knowledge driven global economy, knowledge itself can be seen as a commodity that offers the only 'true sustainable competitive edge'. If knowledge is effectively managed i.e. collected, structured and disseminated, it will bring significant benefit to organisations, with potential benefits to the wider construction industry. There are a plethora of knowledge management tools and solutions on the market. However, the increasing attention of knowledge management is unsurprisingly targeted at very large multinational organisations, with little at the small medium enterprises (SMEs); and even less at construction-related organisations. With over 99% of the construction industry in the UK made up of SMEs, these organisations are in need of knowledge management just as much as large enterprises in order to stay competitive. This paper attempts to present and discuss some of the findings from an on-going 18-months project, funded by the UK Department of Trade and Industry (DTI). The research project adopts a simple and yet robust approach in assisting SMEs to capture their learning experiences, explicate the significant knowledge embedded in the participants' experiences; and transform it into knowledge accessible to a wider audience. In addition, the challenges participants face in their knowledge capture process will be highlighted. The paper will also reflect on the role of information technology (IT) in knowledge capture and communication in SMEs. Conclusions and recommendations for practice and for academia are documented.

Key Words: Knowledge Management, Learning Experience, Small Medium Enterprise, Storytelling

INTRODUCTION

Knowledge resides in many different places such as: databases, knowledge bases, filing cabinets and people's head. It can be seen as the entirety of cognitions and abilities, which are used by individuals to solve problems. This comprises theoretical perceptions as well as pragmatic day to day rules and guidelines and is an organised set of statements of facts or ideas, presenting a reasoned judgement or an experimental result. The construction industry is essentially an information processing industry (Aish, 1999); where most knowledge comes from the successful completion of projects (Conheeny et al, 2000). With the increasing pressure for competitiveness on construction organisations, it is necessary to capture, transfer and reuse project knowledge and use lessons learned from previous projects to improve project performance. Given the complexity of construction-related projects and client organisations, cross-boundary knowledge transactions are of growing importance and the onus on fragmented organisations to share knowledge to deliver client solutions is necessary. The reliance on project participants to share knowledge in order to succeed in project delivery has never been greater (Whelton et al., 2002). Thus, the need for Knowledge Management (KM) in the construction industry is fuelled by the need for innovation, efficiency, improved business performance and client satisfaction.

Transferring knowledge and information across projects is a major challenge for construction organisations. Much construction work is project-based, short-term and task-oriented, promoting a culture where continuous learning is inhibited. Specialist and technical knowledge is lost for one project to the next stifling an organisation's ability to develop knowledge and generate new ideas (Egbu & Botterill, 2002). In this knowledge driven global economy, knowledge itself can be seen as a commodity that offers the only 'true sustainable competitive edge'. If knowledge is effectively managed i.e. collected, structured and disseminated, it will bring significant benefit to organisations, with potential benefits to the wider construction industry. There are a plethora of knowledge management tools and solutions on the market. However, the increasing attention of knowledge management is unsurprisingly targeted at very large multinational organisations, with little at the small medium enterprises (SMEs); and even less at construction-related organisations. With over 99% of the construction industry in the UK made up of SMEs, these organisations are in need of knowledge management just as much as large enterprises in order to stay competitive.

Knowledge Management and Small Medium Enterprises

Small Medium Enterprises (SMEs) are organisations that have less than 250 employees. The weaknesses of SMEs as identified by Egbu (2001) are:

- Inability to fund long-term and risky knowledge management programmes
- Weakness in specialised range of technological competencies
- Weakness in investment on training and education

The strengths of SMEs on the other hand are:

- Its less formal strategies increase the communication of knowledge, speed of decision making and improve informal networks
- Its informal network improve employee commitment and their receptiveness of knowledge management regimes
- They are also able to react faster to changing market requirements and the requisite knowledge to satisfy market needs.

Other weaknesses of SMEs as identified by Rothwell and Dodgson (1994) are that SMEs has little management experience, power imbalance if they are to collaborate with large firms, difficulty in coping with complex regulations and associated cost of compliance.

Hylton (2002) has indicated that SMEs are in need of knowledge management just as much as large enterprises. The reasons cited are that the world has changed rapidly over the past decade and continues to do so. There are more contenders for every dollar or profit, which put great pressure on companies, large and small, to innovate and to develop products rapidly. Both innovation and rapid development require accelerated use of knowledge, knowledge that must be managed efficiently, effectively and securely. In this knowledge driven global economy, knowledge itself is a commodity that offers the only 'sustainable competitive edge'. To remain competitive, companies have to know something and then co-ordinate and use what they know, quickly. SMEs therefore must first know what their knowledge assets are then how to manage and make use of these assets to get maximum return. There are a plethora of knowledge management tools and solutions on the market. However, the increasing attention of knowledge management is unsurprisingly targeted at very large multinational organisations, with little at the small medium enterprises (SMEs); and even less at construction-related organisations.

A THEORETICAL PERSPECTIVE

Knowledge management as a concept is complex. Scarborough et al., (1999) defines knowledge management as any process or practice of creating, acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and performance in organisation. Knowledge management involves knowledge identification, creation, acquisition, transfer, sharing and exploitation. Knowledge management is vital for efficient working in projects and for improving organisational competitiveness (Egbu, 2000a, 2001). Knowledge management can also promote innovation and business entrepreneurship,

help managing change, and emancipate and empower employees (Nonaka and Takeuchi, 1995; Egbu, 2000b; McAdam and McCreedy, 2000; DTI, 2000).

It is widely recognised that organisations often reinvent the wheel, thereby repeating mistakes and wasting resources (Robertson, 2002, Flar, 2002). This often happens when members of an organization are unable to refer to each other's work. However, when knowledge that resides in one part of an organisation is transferred effectively to other parts and used to either solve problems or provide new and creative insights, learning takes place (Goh, 2002). Learning also occurs when knowledge moves from one organisation to another. Knowledge management can facilitate both strands of learning. While the subject matter of knowledge management is about managing knowledge, it also extends to changing entire business cultures and strategies of organisations to approaches that value learning and sharing knowledge. Therefore knowledge management tends to concern people, processes, culture and technology (Flar, 2002).

Tacit and Explicit Knowledge

A wide spectrum of viewpoints and definitions of knowledge have been covered by various authors. Two more prominent definition of knowledge are tacit and explicit knowledge. Tacit knowledge as suggested by Nonaka and Takeuchi is hidden and cannot be easily represented via electronics whilst explicit knowledge is what can be captured and shared through information technology (Martensson, 2000). Further, explicit knowledge can be expressed in words and numbers and shared in the form of data, scientific formulae, product specifications, manuals, universal principles, etc. This kind of knowledge can be readily transmitted across individuals, formally and systematically. Also, it can easily be processed by a computer, transmitted electronically, or stored in databases.

Tacit knowledge is fragile and subjected to decay or loss if not passed on. Knowledge that required tacit exchange is often difficult to commodify and therefore may be considered of higher value (Shariq, 1999). In order for knowledge to become reproducible and useable, tacit knowledge needs to be transformed into explicit knowledge. This interaction between tacit and explicit knowledge can be fruitfully considered as a process of knowledge conversion and creation (Barrett & Sexton, 1999). While it is relatively easy to preserve and transmit explicit knowledge, tacit knowledge is more difficult to transmit. What is lacking at the moment is a complete understanding of effective knowledge transfer within organisations, especially where tacit knowledge is involved (Goh, 2002).

Transferring tacit knowledge

A crucial aspect within knowledge management is that of knowledge sharing or transfer; knowledge transfer is not a case of linear information transfer but a process of 'sense making' (Sparrow, 2001). The knowledge transfer process is ultimately a human-to-human process and this process is inherently interactive and dynamic. Knowledge transfer is enhanced if the environment is right, i.e. people involved, right conditions exist, right means are used and right actions are taken (Collison and Parcell, 2001). During the very process of knowledge transfer, knowledge transforms (Shariq, 1999); a more robust representation of knowledge in its intended form and meaning is needed so as to capture and correctly convey the originator's knowledge. Often there is a strong tacit dimension with how to use or implement explicit knowledge. However, there are relatively few methods and tools to deal with tacit knowledge, and approaches to knowledge dissemination as part of knowledge management system have been found to be mainly ad hoc (McAdam & Reid, 2001).

Storytelling for Knowledge Transfer

Defining data, information and knowledge is difficult (Bhatt, 2001). The construction industry being an industry with vast knowledge and information from previous projects, it is important to capture knowledge for future use. As put forward by Nonaka (1994), knowledge simply cannot be processed as information, because it is continuously re-created and re-constituted through dynamic, interactive social networking activity (Kautz and Thaysen, 2001). This conversion of information into knowledge is best accomplished through social actors, but these social actors are slow in converting data to information (Bhatt, 2001). Thus, knowledge management is best carried out through optimization of technological and social subsystems

and it is through people that information can be interpreted and turned into knowledge (Bhatt, 2001). Based on these reasons, storytelling has been chosen as a form of tacit knowledge transfer for this research.

Storytelling has been identified as one mechanism that may be suited to the transfer of tacit knowledge (Thomas, 2001; Reamy, 2002). One of the most important characteristics of stories is that stories convey not only information but also meaning and knowledge. Stories exist in the realm of knowledge and are particularly suited to knowledge management instead of information management (Reamy, 2002). In representing the deep knowledge within stories, two different ways of using multimedia to capture the richness of stories have been identified by Reamy (2002). The first is to create a movie that captures the story and/or exemplifies the story in a way that goes beyond simply a talking head telling a story, and the second is to create a multimedia representation of the elements of the story and their relationship. Through the use of context, the information contained in stories can be seamlessly incorporated into the story and because it is easier for humans to remember knowledge rather than strings of unrelated bits of information, stories are also used as a medium to codify knowledge.

THE RESEARCH METHODOLOGY

The research reported herein concerns learning from tacit knowledge within the SME organisations in the construction industry. This is done through the process of socialisation and externalisation. By means of socialisation, the tacit knowledge of the research participants is explicated through story telling. The tacit knowledge of site managers is captured initially and inadvertently by means of audio diaries. Greater learning from the stories/diaries are identified or reinforced and externalised by means of debriefing sessions conducted with the participants by the researchers. Issues such as circumstances underpinning the event, the feeling and actions of the participants, the reaction of other people involved in that project and the lessons learned from the event are discussed in the debriefing sessions.

Audio diary as a tool for capturing stories

A diary is a record of events, maintained by someone over time, which can then be collected, and analysed (Burns and Grove, 2001). A diary provides an opportunity to record experiences, perceptions and feelings about daily operations relatively soon after they occurred. A diary is thus a simple tool for encouraging people to capture events as they develop (Zimmeramn and Weider, 1977). Diaries can be written or oral. Written diaries require writing skills and time for composition, which can act as barriers, especially to SME organisations. Audio dairies on the other hand can overcome these shortcomings and can be used in a manner similar to written diaries.

Debriefing

Debriefing was originally used in military campaigns and war games to question and examine persons who had returned from mission or exercise, to establish what had occurred and then develop new strategies as a result of previous experience (Pearson and Smith, 1985). However, the current day context of debriefing refers to a purposeful reflection, which assists learners to develop generalization and to transform experience into learning.

In debriefing, the what, why, how and when of things that happened is explored orally (Kransdorff, 1999). It is a powerful tool which make explicit any tacit learning so that it can be transferred to a wider audience and ultimately to the knowledge base of the industry. The rationale behind debriefing is that individual learning can be enhanced by purposeful reflection. Through debriefings, several individual lessons can also be aggregated, validated and synthesized to produce organizational learning. It is this second operation of debriefing that involves the transformation of tacit knowledge to explicit knowledge thus formatting it for dissemination.

CHALLENGES FACED BY PROJECT PARTICIPANTS

Along with the benefits of knowledge management many barriers exist, thus turning the management of knowledge into a very challenging task to do. A barrier can be considered to be 'Everything related to human, organisational and/or technological issues that obstructs the intra- and inter-organisational management of knowledge' (Wunram et.al, 2000). Therefore, these barriers can basically be allocated to the TOP (Technology, Organisation, People) categories of socio-technical systems classification (Thoben, 2002).

From our research the challenges participants faced in their knowledge capture process are identified as below:

Technology

As discussed earlier, SMEs are weak in specialised range of technological competencies. The technologies employed in their knowledge capture process are also usually equipments used in their day-to-day running of their tasks. Although attempts may have been made to capture knowledge, no advanced or innovative technologies are roped in to help in the process.

Organisation

There is a lack of awareness of knowledge management strategies and instruments in the SMEs. The necessary awareness for the management of knowledge is relatively low among the responding companies. There is a lack of knowledge capture strategy in place and no company had an explicit knowledge management strategy implemented, nor determined corresponding responsibilities. Very often, employees are not aware of the knowledge capture process and often look for quick fixes in their work to fight the symptoms of a problem and not its cause, thereby missing the opportunity to record their experiences and let alone transferring their knowledge amongst the staff. When questioning why people tended to look for quick fixes instead of lasting solutions efforts related to time and costs were almost always mentioned. Although SMEs may be aware of the power of knowledge management and the importance of knowledge capture in their organisation, they often feel that they have other more pressing priorities and needs. In addition, knowledge capture may be seen as a 'big boys' thing or even as a fad that only big companies can afford to indulge in.

People

Communication barrier was mentioned to be a problem when dealing with people. A common problem in this context occurs when two colleagues of the same company and are involved in the same project but belong to different domains. The understanding of what they are talking about can be significantly different. Although SMEs may have a less formal communication channel, the barrier of idea robbery still exists; the fear that the idea of an individual employee could be taken by another who then gets the acknowledgement and rewards for that idea. Thus, there is a need for the protection of proprietary knowledge among employees and this hinders knowledge transfer and capture. Another barrier that SMEs faced is finding the time to capture knowledge. People are overstretched and the knowledge capture process may impact too much in their activities.

INFORMATION TECHNOLOGY (IT) AND KNOWLEDGE MANAGEMENT

IT is becoming increasingly important to KM in construction organisations (Egbu & Botterill, 2002). Many organisations employ IT in one form or another to manage their knowledge and, in general, IT is used primarily to store and transfer explicit forms of knowledge. In addition, IT can also be used to aid collaboration and co-operation between people, and as tool to assist the transfer of knowledge and information between project teams, enabling the development of new knowledge for innovation. However, the construction industry has been slow to recognise the benefits of IT as a major communication tool

(Egbu et al., 2001). Research (Egbu & Botterill, 2002) has shown that the most frequently used techniques and technologies in construction organisations are: telephone, Internet/intranet/email and documents and reports. These are closely followed by face-to-face meetings and interaction with the supply chain. Although construction organisations are investing more in some aspects of IT, such as the Internet, greater emphasis is put on the more conventional techniques for acquiring, developing, sharing and storing knowledge. IT should be understood less in its capacity to store explicit information and more on its potential to aid collaboration and co-operation between people (Egbu & Botterill, 2002). Dougherty (1999) argues that IT should be seen as a tool to assist the processes of KM in organisations.

Communication is a vital part of organisational activity and IT has a central role to play in the communications of the organisations (Egbu et al., 2001). However, IT is a poor substitute for converting information into knowledge (Bhatt, 2001). It is only through people, that information is interpreted and turned into knowledge. The role of IT in knowledge capture in SMEs is not significant. Although IT has been extensively used for communication in SMEs, the use of IT as a knowledge capture tool is still in arrears. This may be due to the lack of awareness of knowledge management in the SMEs; let alone knowledge capture, their financial limitation and also their weakness in education and training which hinders their skills in IT.

In this project, we have employed the use of IT in assisting with knowledge capture –

- a) event diary,
- b) debriefing,
- c) post project review

A website using Microsoft Frontpage as illustrated below is created, whereby users are able to conduct online debriefing, record an event diary or do a Post Project Review. Under the event diary section, users are given the option to listen to events recorded by their colleagues, record an event orally using the audio diary or key in an event in which they have encountered in the process of their work.

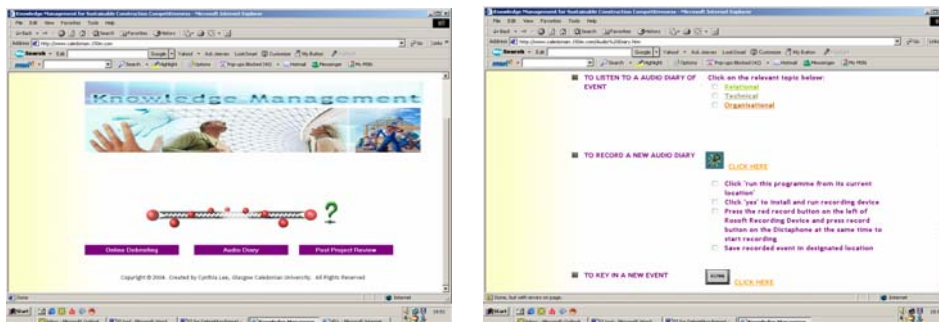


Figure 1: Screenshots of the webpage created for knowledge capture

In this project, the audio diaries recorded by users are kept under three broad areas: Relational, Technical and Operational. Users are able to click onto the relevant topic to listen to an event recorded by their colleagues. Audio Diary can be created using Rosoft Audio Recorder. This software can be downloaded free of charge from <http://www.downloads.com>. To do a recording, the software is activated and a recording screen will appear on the computer. Users will need to plug in their Dictaphone and press the record button on the Rosoft Audio Recorder as well as on the Dictaphone and the events can be recorded and saved into to their company database. Upon creating the above said audio diary under different topic, it will be stored in the database where users can select to listen to the audio diaries of their colleagues and learn from their experiences by simply clicking the appropriate button on the relevant topic and the audio diary will be played.

Next, to key in an event and create an event database, Microsoft Access is used (see Figure2 for an illustration of the database). A link is created on the website and users will need to click on the 'ENTER' button and download the file to key in the event. In addition, users can conduct an online debriefing. The

created document can be uploaded to their intranet by the SMEs and answers to the debriefing questions can be keyed into the text boxes by individuals (Please see Figure 3 below). Then a submit button is set at the bottom of the page and answers to the questions are submitted electronically and kept in the company database. Similar to the event database, users can also create a database for post project review which enables users to evaluate projects and learn from them. This will enable project information to be captured, retained, indexed so that people external to the project can retrieve and apply it to future tasks/projects. By reviewing projects, it will prevent 're-inventing the wheel' and repeat mistakes.

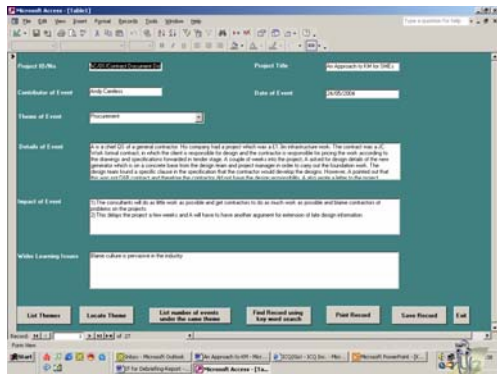


Figure 2: Screen shots Event database

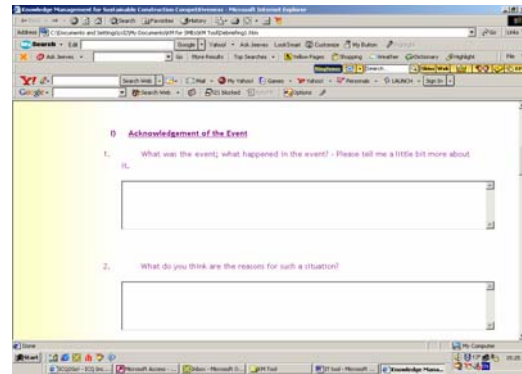


Figure 3: Screen shot of Online Debriefing

CONCLUSION AND RECOMMENDATION

When both tacit and explicit knowledge interact, new knowledge and innovation can often emerge (Ingirige et al., 2002). Knowledge is rapidly becoming the most important asset of virtually all organisations and organisations in the construction industry are no exception. The ability to manage and exploit knowledge will be the main source of competitive advantage for the construction industry of the future. Knowledge management may help SMEs develop for the future and have more sustainable business practices, making them less vulnerable to the economic cycles of the industry.

Knowledge sharing will minimise the knowledge loss that will result in the event of a straightforward transfer of tacit knowledge to explicit forms. McDermott (1999) argues that IT tools alone cannot effectively perform knowledge conversion, unless certain other conditions such as trust, face-to-face contact, time to interact between participants and creation of a common language are in place. Outlined above are the challenges faced by SMEs in knowledge capture. In order to bring knowledge management to its next lap, SMEs need to look into their work procedures and incorporate the knowledge capture process into it. In addition, SMEs also need to be able to identify their sources of knowledge in order to be able to capture it. For SMEs to implement knowledge management system, investment on education, training and infrastructure need to be increased. Lastly, SMEs should adopt the policies and practices of the larger, more prosperous organisations and breakdown its resistance to change. Like large companies, SMEs should take action to capture and store the existing tacit knowledge within the company.

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