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Key Issues for Implementing Knowledge Capture Initiatives in Small and Medium Enterprises in the UK Construction Industry

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There is now a great deal of interest among researchers and practitioners regarding the importance of knowledge management (KM) in an organisational context. Few large construction organisations have implemented and reaped the benefits of formal KM approaches. However, there are very few empirical studies on knowledge capture geared towards small and medium enterprises (less than 250 employees) in the construction industry. This paper is based on a research conducted among 26 small and medium enterprises (SMEs) in the UK construction industry. The paper explores the characteristics of SMEs as well as the key knowledge capture issues that confront them. These issues involve social, cultural and technological considerations, which demand a robust research methodology in their investigation. The research methodology for the study is also appraised in this paper. The paper concludes that if knowledge capture is to lead to a source of sustainable competitive advantage, SMEs should adopt a holistic and integrated approach to knowledge capture by considering top management, culture, processes, tools and training at the core of their knowledge capture strategy.

Keywords: culture, knowledge capture, small and medium enterprises, top management.

INTRODUCTION

Knowledge management (KM) can promote innovation and business entrepreneurship, help manage change, and emancipate and empower employees (Nonaka and Takeuchi, 1995). Knowledge capture issues have been raised by the US Army, the Columbia Accident Investigation Board, the Aerospace Safety Advisory Panel, and the Government Accountability Office, USA (Kontzer, 2002; Goodman, 2005). The issues these organisations face are: support of top management for knowledge capture initiatives, resource (time, finance and people) allocation to capture knowledge, motivation to capture knowledge, embracing appropriate culture to capture knowledge and embedding organisational-wide processes to capture knowledge. Hari *et al.* (2004) emphasised the need to investigate the key issues SMEs face in implementing knowledge capture initiatives in the UK construction industry, as there seem to be little or no empirical studies. Hari *et al.*'s (2004) study involved 12 professionals from 11 SMEs in the UK construction industry.

The key issues for the implementation of knowledge capture initiatives identified through a thorough review of literature are broadly classified under four headings: top management, resources, culture and processes. These are discussed below.

TOP MANAGEMENT

Many authors have agreed that knowledge loss is an alarming issue for SMEs. Notably, when key employees leave a company they would take with them all their accumulated and valuable knowledge unless it is captured, codified and shared (Wong and Radcliffe, 2000; Kimpeler, 2001; Finn and Phillips, 2002). Such a brain-drain would pose a significant threat to the operation of SMEs if they were unable to retrieve the necessary knowledge. In addition, they could face difficulties in finding a replacement person who has similar knowledge and experience within the organisation. All too often, a successor will have to learn everything from scratch. This may lead to inefficiency, 'reinvention of the wheel' and duplication of effort, which will undoubtedly jeopardise an organisation's performance.

In order to reduce the adverse effect of knowledge loss, organisations should have a mechanism in place to capture, codify, articulate and make their employees' knowledge explicit. It should be converted into a form which can be explicitly stored and readily retrievable, so that when employees leave a company, their knowledge remains within the organisation.

RESOURCES

SMEs experience great difficulty in attracting capital, especially risk capital. Low turnover, cash flow / debtors difficulties, tax burden, access to finance, and high interest rates are some of the problems faced by SMEs (Storey, 1994). SMEs seem to lack the necessary capital investment for the systematic use of information and knowledge for developing organisational processes and technology. The most important barrier for growth appears to be lack of vision and flair by the management team in considering the development of new business areas beyond their existing experience and the role which knowledge capture plays. In terms of positioning the firm against the market, small firms are especially handicapped by their limited resources (finance, time and people) and the restricted range of assets they have (Barber *et al.*, 1992).

CULTURE

SMEs obviously comprise fewer employees than their larger counterparts. This certainly gives them a distinct advantage since it is easier to get all the employees together to initiate and implement a change (Axland, 1992). In addition, employees normally know each other more intimately and have face-to-face contact with one another, so there is a greater likelihood that support for knowledge capture is obtained more easily. Converting tacit (informal) knowledge into explicit (formal) knowledge and capturing such knowledge is essential in an organisation with scarce resources. The concept of 'knowledge is power' has to be tactfully tempered by the notion that shared knowledge stays with the giver, while it enriches the receiver. This notion of 'increasing returns of knowledge' needs to be vigorously promoted. Motivation is the responsibility of both management and individual staff. Organisations must find ways to motivate employee to capture what they know and to apply the knowledge of others, contributing to the knowledge capturing culture.

Some authors assert that the source of sustained competitive advantage lies in the human resources themselves, and not in the practices used to attract, utilise or retain them (Ferligoj *et al.*, 1997; Wright *et al.*, 1994). By contrast, other scholars argue that knowledge capture practices themselves can be viewed as organisational competencies, such as the ability to motivate employees, handle internal structure and processes (Goodman 2005; Kontzer 2002). Using either interpretation, people are viewed as important contributors to the success of the firm.

PROCESSES

SMEs have less formal working systems and procedures. The documentation of key knowledge is rare and it is normally not properly stored in a readily retrievable format for future use. Most small firms may feel that it is not feasible to establish a formal system for codifying, organising and storing knowledge because they are always busy with their daily routines. Building and maintaining a knowledge repository demands substantial effort and hence, they are likely to resist. They need to react rapidly in their working environment and it may well be considered a waste of time for them to codify their know-how.

The knowledge capture process is concerned with incorporating knowledge about the organisation's products, services and practices. In general, organisations need to exploit, utilise and apply knowledge in their outputs, processes and practices in order to derive maximum value from it. As stated by Bhatt (2001), applying knowledge means making it "more active and relevant for the firm in creating values". If knowledge is not used to its fullest then there will be an enormous waste of resources.

Having identified and discussed the above four key issues (top management, resources, culture and processes) through a literature review, the next step was to conduct an exploratory study in SMEs in the UK construction industry. The research study adopts a grounded theory approach as a systematic means of investigating knowledge capture in SMEs.

RESEARCH METHODOLOGY

In this study a qualitative research approach which includes grounded theory has been adopted to uncover many of the complex and intricate issues associated with knowledge capture in SMEs. Glaser and Strauss (1967) first described the method of grounded theory as a means of enabling the "systematic discovery of theory from the data of social research". Since then two different approaches have emerged: the Straussian and the Glaserian. It should also be noted that a number of other adaptations have been developed, as identified by Heath and Cowley (2004). Backman and Kyngas (1999) suggest that the researcher should follow one particular author, i.e. Glaser or Strauss, and then develop his/her own method using one of these as a foundation for analysing data. If the researcher was to apply a combination of applications of grounded theory from different texts then this would undoubtedly result in confusion and the resulting findings would be lacking in substance. Hence this study chose the Strauss and Corbin methodology for analysis of data.

In terms of obtaining a suitable sample size in grounded theory, the grounded theorist does not decide on the size of the sample population before the study begins. Sample size is deemed to be satisfactory only when the key concepts that have been identified from the collected data have reached saturation point; in other words, when no new data emerge. However, Morse (2000), cited in Robson (2002), suggests that to reach saturation point, the sample size depends on several factors: the scope of the study, the nature of the topic, quality of the data, study design and research technique. Semi-structured interviews were used as the research technique for this study. Morse (1994) produced a 'rule of thumb' for grounded theory studies, recommending approximately 30 to 50 interviews. This research included 53 interviews in 26 organisations.

Organisations that participated in the study employed more than 10 people but less than 250 employees. The database for the study was collected from the Small Business Gateway (2003) for the construction industry. The period of study was from 5 April – 27 August 2004 in Scotland, UK. Attempts were made to obtain a sample

across architecture, engineering and construction organisations. The data analysis is reported in the next section.

KEY ISSUES FOR IMPLEMENTING KNOWLEDGE CAPTURE INITIATIVES IN SMEs IN THE UK CONSTRUCTION INDUSTRY

Table 1 shows five key issues associated with implementing knowledge capture initiatives, as revealed through the exploratory study. It also illustrates the number of interviewees, the number of organisations and the relevant percentage.

Main challenges for implementing knowledge capture initiatives	Number of interviewees (N=53)	Number of organisations (N=26)	Percentage (Number of organisation/ total number of organisation)
Lack of top management support for knowledge capture initiatives	50	25	96%
Lack of provisions for training on knowledge capture initiatives	48	24	92%
The creation of an appropriate culture for knowledge capture initiatives	47	23	88%
The adoption of appropriate processes for knowledge capture.	42	22	84%
The adoption of appropriate tools (techniques and technologies) for knowledge capture.	40	21	81%

Table 1: Key issues for implementing knowledge capture initiatives in SMEs in the construction industry.

From the data in Table 1 it is evident that the main challenge for implementing knowledge capture initiatives is lack of top management support.

LACK OF TOP MANAGEMENT SUPPORT FOR KNOWLEDGE CAPTURE INITIATIVES

In the current study, 25 out of 26 organisations (96%) noted that top management support for knowledge capture initiatives is a challenge. This is because of a lack of awareness of knowledge capture benefits; lack of vision, mission and strategy; and lack of structure for knowledge capture initiatives.

Out of the 26 organisations that participated in the current study, only three organisations have vision and mission statements for information technology. None of the organisations in this study noted that there were any specific visions or mission statements for knowledge capture initiatives. However, some elements of knowledge capture initiatives were evident in all the organisations that participated in the study. This calls for real and urgent attention in the role of management over establishing an infrastructure that can actually bring about change and implement the organisation's mission, vision and strategy with respect to knowledge capture in SMEs in the construction industry. The importance of expressing the vision to the rest of the organisation is paramount. There is need for a long-term vision of knowledge capture to be incorporated into the corporate strategy of the organisation. This is only achievable if the mission towards knowledge capture is fully understood in the organisation.

An interviewee of a medium-sized organisation that participated in the study noted that

"there is a wealth of knowledge within the company. If you know the right person to speak to and the right question to ask at the right time, then you will certainly get a huge amount of knowledge which is informal in nature."

This observation was also reiterated by an interviewee in a small-sized organisation who stated that

"any information or knowledge generated is lost because people just pass information or knowledge on to each other verbally. If somebody has up-skilled their experience and they leave the organisation that leaves a knowledge gap."

The above views of the interviewees indicate that there is a lack of strategy to capture key knowledge, which was evident in all the 26 organisations. Hansen *et al*. (1999) discussed the importance of having a strategy for managing an organisation's knowledge and identified several cases where having the wrong strategy or no strategy caused organisations to fail to utilise their knowledge. Toftoy and Chatterjee (2004) argue that small businesses operate without a clearly defined strategic plan and an honest, concise and meaningful mission statement. 50 of the 53 interviewees noted that having a strategy for knowledge capture reflected on top management support to obtain the involvement of all organisational members and their willingness to capture and use knowledge on a continual basis.

An interviewee from one of the medium-sized organisations stated that

"In prison service job, they have different halls. For example, hall "A", hall "B", hall "C", we prepared the quantities for the first one; had we used the billing system, we would have had standards for that type of buildings, and we would have saved lots of time doing the subsequent jobs. We have still not done the hall "E" and somebody new will be starting that from scratch."

This quotation illustrates the amount of time spent in doing the same type of work from scratch. If the organisation had developed standard billing system, time would be saved and the "reinvention of the wheel" would possibly have been eliminated. This agrees with the empirical findings of Proudfoot Consulting (2002) which concluded that poor planning, inadequate management, poor working morale, IT problems, poor communication and inadequate communication caused the loss, on average, of 110 days per year in British companies (Proudfoot Consulting, 2002). This situation was also evident in 25 of the 26 organisations that participated in the current study. They all noted that the lack of management support for implementing knowledge capture initiatives in SMEs is a key challenge. Matsumoto *et al.* (2005) argue that within the architecture, engineering and construction industries, companies recognise that they can no longer afford to reinvent the wheel and must learn to better capture the necessary knowledge to improve the quality and effectiveness of the organisation. This seems to suggest that a lack of awareness of knowledge capture benefits is prevalent in SMEs in the construction industry.

Twenty three (23) out of the 26 organisations that participated in the current study have ad hoc quality systems in place and it was the role of the owner/partner/managers to ensure quality of work. The analyses of data in this study indicate that consultants were hired in three medium organisations for quality assurance (QA) systems. However, the QA systems were not being not rigorously followed in two of the companies as there was no structure in place or person to review the QA systems. It was interesting to note that only one company had a person in charge of the QA who made regular

documentation of the quality system. The checklists, which formed part of the QA system, were revisited regularly to monitor whether key technical aspects were being considered during project execution. The checklists could be considered as a form of knowledge capture, where lessons could be learnt and best practices incorporated. This seems to suggest that there is a need for a structure to capture knowledge in SMEs in the construction industry. However, one of the main challenges SMEs face is a shortage of resources, especially having a dedicated person for knowledge capture initiatives. Hence it could be suggested that the owner/partner/managers be the gatekeepers of knowledge capture activities, with a formal procedure to capture and store knowledge in SMEs in the construction industry.

In one of the medium-sized organisations of the 26 that participated in the current study, it was noted that lack management support was not a challenge to implementing knowledge capture initiatives. This is because one year ago (prior to the current study interview), the importance of knowledge capture was realised when one of the key working partners who specialised in construction law died due to a cardiac arrest. This resulted in a major 'knowledge loss' to the organisation. Others in the organisation's management hierarchy tried to fill the job role but failed. One of the partners of the medium-sized organisation attended a workshop on knowledge management, where a few of the discussed topics highlighted issues of knowledge capture. This raised the awareness of the potential benefits of knowledge capture initiatives. The management of the medium-sized organisation developed a strategy which involved allocating resources, and built support and enthusiasm for knowledge capture. Some of the knowledge capture initiatives included: time allocation to document lessons learnt and best practices during different stages of projects and from peers in the organisation; templates prepared to capture knowledge during projects, as well as from experts within the organisation; and the formation of communities of practice within the organisation. One of the employees at management level was dedicated to ensure formal knowledge capture practices. This person was also involved in the QA systems of the organisation.

It could be inferred that without top management support and commitment, no knowledge capture initiatives will take off. Top management in SMEs need to understand knowledge capture as a key business driver rather than as a resource-intensive additional initiative. While introducing knowledge capture, a logical sequence should be used to minimise effort and cost, resulting in products or services being marketed more quickly.

APPROPRIATE TRAINING FOR KNOWLEDGE CAPTURE INITIATIVES

Cunningham (1992) and Brown and Duguid (1991) suggested that training is more than the transmission of abstract knowledge. Knowledge can be constructed in interactions with the social and physical world. Training experiences or events may, therefore, need to be developed in a way to nurture both knowledge capture and also construct new knowledge in a given context. In the current study, 48 interviewees in 24 out of 26 organisations (92%) noted that appropriate training for knowledge capture was a challenge. This is because of lack of time, budget, a formal training strategy and difficulties associated with training during normal working hours.

Providing appropriate training for knowledge capture initiatives seems to have had opposite effects on productivity in the interviewed organisations. 25 interviewees noted that training for knowledge capture is assumed to raise the productivity of individual employees, which can increase production at organisational level. On the other hand, 28 interviewees commented that training reduces the number of productive hours.

Westhead and Storey (1997, 1999) found that both managers and employees are less likely to get formal training in a small firm. Firms that are faced with a limited training budget should be aware that only a part of the budget should be spent on training courses themselves. Firms with less than 50 employees should consider spending less money on training courses and more time on supporting employees that follow a training course. Case studies amongst small British firms that followed the Investors in People programme also conclude that even small firms benefit from a more formal training approach (Goss *et al*., 1994). However, 48 interviewees from 24 organisations emphasised that a lack of appropriate formal training in knowledge capture initiatives presented a challenge. They also suggested that lack of time and budget were the two main challenges to attending training.

The analysis of data obtained in the current study suggests that training for knowledge capture in SMEs in the construction industry follows a fragmented approach. This adversely affects both the organisation and employees, especially with respect to external training. Westhead and Storey (1996) argue that many providers of training are focused on the requirements and needs of large firms, making their services less suitable for small firms. Employees who are expected to apply what they have learned in the training to their on-the-job behaviour may well become frustrated, angry and eventually less productive when organisational requirements contradict training instructions. The organisation obviously loses the time and money spent on training and eventually suffers because of reduced productivity. This scenario was noted by 40 interviewees in this current study. Hendry *et al.* (1991) conclude that owners of small companies view any training beyond the level necessary to perform their immediate jobs as a luxury to be provided only when the firm is making large profits.

The interviewees who participated in the current study revealed key issues on training. In one medium-sized organisation, an owner admitted that there had been little training in the past and that there were no formal strategies set up to develop this. However, there were informal strategies for training people. One of the managers in another medium organisation claimed that training was offered in response to the needs or requests of certain individuals. This ad hoc and informal approach to training does not constitute a corporate strategy. The above results from this study call for real and urgent attention concerning the appropriate training for knowledge capture in SMEs in the construction industry. It can be inferred that there is a need for formal in-house training on knowledge capture.

AN APPROPRIATE CULTURE FOR KNOWLEDGE CAPTURE INITIATIVES

The analysis of data in the current study indicates that the creation of an appropriate culture for knowledge capture initiative is a challenge for 23 out of the 26 organisations (88%). This is due to ‘knowledge-power syndrome’, a blame culture, friction between staff, lack of trust and lack of motivation. There is a need for management support for knowledge capture initiatives through having an organisational-wide strategy that is effectively linked to the vision and mission of SMEs in the construction industry. This has to be communicated clearly, concisely and continuously, which will lead to the eradication of the ‘silo syndrome’.

The silo syndrome is where managers work in the narrow confines of their departmental walls, see their colleagues as competitors and hoard valuable knowledge. In most cases the ‘silo syndrome’ is a symptom of management failure in an environment that promotes silo behaviour. The ‘silo’ mentality is counterproductive to knowledge capture initiatives. A pervasive silo mentality can lead to a ‘moribund’ organisation - an organisation that is dying a slow death. Many experienced construction professionals see knowledge as power and are reluctant to share it. Most people are also reluctant to learn from others’ experience – ‘not invented here’. 47

interviewees from 23 of the organisations which participated in the current study showed elements of 'custodian of knowledge'.

Participants from all of the organisations in the current study recognised that a common barrier is the reluctance of individuals in the organisation to share their knowledge and ideas. The major reason behind this is that knowledge is seen as power. The perception is that holding onto individual knowledge makes a person more valuable to the organisation, while capturing that knowledge makes a person vulnerable and almost expendable. This is supported by Davenport (1997), who claims that some managers see knowledge capture as threatening and 'unnatural'. In the current study, an engineer of a medium-sized organisation remarked that there is an inter-departmental shift in culture. In his department the culture is open and knowledge capture is easy while "across the corridor nobody ever seems to speak". Culturally, there has been some friction between departments and with such disparity the growth of a holistic organisational culture seems questionable. This also seemed to be a challenge for 16 organisations in this study that had regional offices spread across UK and Europe. The geographical separation of sites, both from one another and from the regional offices have a detrimental effect on the capture of knowledge because of the importance placed on social networks and contacts. The establishment of a network throughout an organisation (each with its own internal and external networks and contacts) provides a base of knowledge and support that individual employees can draw upon to help them diffuse ideas and expertise within their own context of work.

In addition, 40 interviewees stated that knowing who knows what in an organisation and encouraging people to take advantage of this creates a culture of knowledge capture, sharing and use of that knowledge. A knowledge capture culture could be conducive where it is:

- acceptable to ask for help.
- reasonable to make mistakes.
- possible to share lessons in a culture of continuous improvement.

Furthermore, 27 out of the 53 interviewees stated that when individuals engage in the capture of tacit knowledge, knowledge sharing relationships are developed. It is a managerial responsibility to build the right kind of relationships where tacit knowledge exchange adds value to the organisation as a whole. In other words, an organisational culture is where the knowledge capturing process becomes embedded and the tacit knowledge of individuals can be turned into corporate knowledge and exploited for competitive advantage.

Fourteen (14) organisations that participated in this study had adopted an open-door policy to encourage informal knowledge capture. A manager emphasised a "close-knit" environment that cultivated inclusion. The open and informal culture depicted here reveals a sense of oneness. This meant that the employees could discuss technical details with their managers at any point in time. The results indicate that culture plays an important role in the effective implementation of knowledge capture initiatives in SMEs.

APPROPRIATE PROCESSES FOR KNOWLEDGE CAPTURE INITIATIVES

The analysis of the data in the current study suggests that the adoption of appropriate processes for knowledge capture initiative is a challenge for 22 out of the 26 organisations (84%). The key findings regarding appropriate processes for knowledge capture in SMEs in the construction industry are:

- A strong reliance on informal networks and collaboration, and 'know who' to locate the repository of knowledge.
- The involvement of people in different activities as the primary means by which knowledge is captured.
- Within firms with hierarchical organisational structures, there is a reliance on departmental/divisional heads to disseminate knowledge captured at their level by people within their sections.

Twenty two (22) out of the 26 organisations (84%) in the present study have a project database. Each project database has a project folder. Each of the organisations interviewed have got their unique way of numbering the project folders. One of the interviewees stated that:

"Right at the beginning of the project, what happens is we open a folder and that becomes a working folder, which is kept by the job runner. We have to access the job folders. It is put as 2000, 3000, 4000, 5000, 6000 and 7000. The jobs are all listed in the server. The 2000 and 4000 are large jobs. The 3000, 6000 and 7000 are small jobs. So that is the kind of project numbers you tend to kind of go for. All the job files are in the server, until they are archived. Within each job number there is a list of sub folders, so all correspondence and reports are there in that folder. Meetings are there in another folder; drawings are in another folder. We have fairly rigid system. It is stored so that everybody can access the information electronically".

The interviews conducted with 53 professionals revealed that project folders for each stage were maintained (pre-construction, construction and post-construction stages). It could be argued that the project folders have some elements of explicit knowledge which forms a part of knowledge capture processes.

As an example of how useful a database can be, one of the interviewees noted that

"a client in Liverpool wanted the exact same cinema building that was built in Inverness. Therefore he took the same design team to Liverpool. We sat down and discussed the good and bad points that were experienced in the Inverness project. We did benefit from it greatly because the project files contents were in electronic format. It was the fastest project ever done".

The same interviewee from a medium-sized organisation also noted that in other projects the duplication had not been done to that extent, but that the organisation had benefited in terms of the amount of work with the same workforce and with the help of technology. The interviewee further suggested that knowledge and experiences gathered in different projects were not being systematically and successfully integrated into organisational knowledge bases. This point was noted by 23 out of the 26 organisations. Kamara *et al.* (2002) suggest that the effective management of project knowledge and the ability to learn from past project experience are important for organisations to improve continuously.

APPROPRIATE TOOLS FOR KNOWLEDGE CAPTURE INITIATIVES

In the current study 21 out of 26 organisations (81%) suggested that selecting the appropriate tools (techniques and technologies) for knowledge capture is a challenge. This is because of rapid technology development, lack of finance and people's attitudes to the use and exploitation of knowledge capture tools.

Three (3) organisations in this study have developed an in-house intranet. This was as a repository for important documents such as templates for the financial appraisal of

construction sites, time sheets and other spread sheets. It was agreed that such useful documents needed to be readily accessible to everyone inside the organisation and IT speeded up this process. One of the interviewees noted that over a 6-month period of using the intranet, the documentation and preservation of critical knowledge became a normal and expected part of engineering tasks (what was done, why it was done, how it was done, how the results of the work were implemented or factored into decision making). One of the three organisations stated that training was given to young engineers to properly present, document and preserve their work to ensure the continuance of appropriate knowledge preservation habits throughout their time in the organisation.

The other 21 out of the 26 organisations (81%) noted that the rapid technology development was a challenge because of:

- Lack of standardisation of knowledge capture systems, practical difficulties in accessing the intranet and website from site offices, and the lack of IT-related resources such as software and technical support.
- Techniques and technologies developed to capture and publish knowledge have had to compromise one way or another between simplicity and specificity.

These 21 organisations revealed that information and communication technology (ICT) would be beneficial to SMEs in the construction industry through the setting of an industry standard for knowledge capture, by the reduction in the cost of investment and by enabling the better manipulation of drawings which are easier to read and work with. This would be aided by ICT becoming more user-friendly, with more portable computers and improved site access.

Nineteen (19) out of the 26 organisations (73%) highlighted difficulties in allocating finance for implementing the appropriate technology for knowledge capture. The reasons were:

- The allocation of staff time to contribute to the knowledge base.
- Employees need to be trained in understanding the importance of knowledge capture systems so that they can be used efficiently.
- Employees who need to search for an answer to a question find that they do not have enough time to search the knowledge base. Instead they normally prefer to ask an experienced colleague.

In 18 out of the 26 organisations in the study, the interviewees claimed that there was some reluctance among older employees to use IT, or use it effectively, generating doubts about the success of IT in their organisations. Nahapiet and Ghoshal (1998) acknowledge this problem and assert that “the availability of electronic knowledge exchange does not automatically include a willingness to capture and share information, and build new intellectual capital” (as cited in Scarbrough *et al*., 1999). It is clear that attitudes about IT can affect its effectiveness as a knowledge capture tool.

CONCLUSION AND RECOMMENDATION

There are many factors that have given impetus to the challenges associated with knowledge capture initiatives. It is evident from this research that ad hoc knowledge capture practices predominantly exist in SMEs in the UK construction industry. The paper explores the characteristics of SMEs as well as the key knowledge capture issues that confront them. These issues involve social, cultural and technological considerations which demand a robust research methodology in their investigation. The research methodology for the study is also appraised in this paper. The paper

concludes that if knowledge capture is to lead to a source of sustainable competitive advantage, SMEs should adopt a holistic and integrated approach to knowledge capture by considering top management, culture, processes, tools and training at the core of their knowledge capture strategy. It is recommended that there is ample scope for more qualitative research to uncover a host of other complex and intricate issues associated with knowledge capture in SMEs, including incentives and other motivational constructs that encourage individuals and SMEs to exploit requisite technologies in the capture of knowledge.

REFERENCES

Axland, S. (1992), "Small wonders", *Quality Progress,* 25(11), 29-34.

Backman, K. and Kyngas Helvi, A. (1999), "Challenges of the grounded theory approach to a novice researcher", *Nursing and Health Sciences*, 1, 147-153.

Barber, J., Metcalfe, J. S. and Porteous, M. (1992), *Barriers to Growth in Small Firms*, Routledge, London.

Bhatt, G. D. (2001), "Knowledge management in organizations: examine the interaction between technologies, techniques and people", *Journal of Knowledge Management,* 5(1), 68-75.

Brown, J. S., Duguid, P. (1991), "Organizational learning and communities-of-practice: toward a unified view of working, learning, and innovation", *Organization Science*, 2(1), 40-57.

Cunningham, D. J. (1992), "Beyond educational psychology: steps toward an educational semiotic", *Educational Psychology Review*, 4(2), 165-94.

Davenport, Tom (1997) "Secrets of Successful Knowledge Management", *Knowledge Inc.*, February.

Ferligoj, A. I., Prasnikar and Jordan, V. (1997), "Competitive advantage and human resource management of SMEs in a transitional economy", *Small Business Economics,* 9, 503–514.

Finn, W. and Phillips, T. (2002), "Know your assets", *Director,* 55(11), 80-84.

Glaser, B. and Strauss, A. (1967), *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Aldine, Chicago.

Goodman, J. L. (2005), "Knowledge capture and management – key to ensuring flight safety and mission success". Proceedings of American Institute of Aeronautics and Astronautics Space Conference, 30 August – 1 September, Long Beach, CA.

Goss, D., Adam-Smith, D. and Gilbert, A. (1994), "Small firms and HRM: exceptions that prove the rule?", *Journal of Small Business and Enterprise Development*, 1(2), 2-8.

Hansen, M. T., Nohria, N. and Tierney, T. (1999), "What's your strategy for managing knowledge?", *Harvard Business Review*, March-April, 106-116.

Hari S., Egbu C. and Kumar B. (2004), “Knowledge capture In small and medium enterprises in the construction industry: challenges and opportunities”. Proceedings of 20th Annual Conference Association of Researchers in Construction Management (ARCOM) 2004, September 1-3, Farzad Khosrowshahi, University of Herriot-Watt, Edinburgh, UK.

Heath, H. and Cowley, S. (2004), “Developing a grounded theory approach: a comparison of Glaser and Strauss”, *International Journal of Nursing Studies*, 41(2), February, 141-150,

Hendry, C., Jones, A., Arthur M., and Pettigrew, A. (1991), “Human resources development in small to medium sized enterprises”, Employment Department, London.

Kamara, J. M., Augenbroe, G. and Carrillo, P. M. (2002), “Knowledge management in the architecture, engineering and construction industry”, *Construction Innovation,* 2, 53-67.

Kimpeler, S. (2001), “What is knowledge management in theory and practice?” Proceedings of the Baltic-Net Conference on Knowledge Management in Networks and Innovation Systems in Regions in Transition, 15 June, Agerskov, Denmark.

Matsumoto, I. T., Stapleton, J., Glass, J., Thorpe, T. (2005), “ A knowledge-capture report for multidisciplinary design environments”, *Journal of Knowledge Management*, 9(3), 83-92.

Morse, J. M. (1994), “Designing funded qualitative research”. In Denzin, N. K. and Lincoln, Y. S. (eds.), *The Handbook of Qualitative Research*, Thousand Oaks, Sage, CA.

Nahapiet, J., Ghoshal, S. (1998), “Social capital, intellectual capital and the organizational advantage”, *Academy of Management Review,* 23, 242–266.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation,* Oxford University Press, Oxford.

Proudfoot Consulting (2002), “Untapped potential. The barriers to optimum corporate productivity”, Proudfoot Consulting, London.

Robson, C. (2002), *Real World Research: A Resource for Social Scientists and Practitioner Researchers*, Blackwell Publishers Inc., USA.

Scarbrough, H., Swan, J. and Preston, J. (1999), “Knowledge management: a literature review”*,* Institute of Personnel and Development, London.

Storey, D. J. (1994), *Understanding the Small Business Sector,* International Thomson Business Press, UK.

Toftoy, C. N. and Chatterjee, J. (2004), “Mission statement and the small business”, *Business Strategy Review*, Autumn.

Westhead, P. and Storey D. J (1996), “Management training and small firm performance: why is the link so weak?” *International Small Business Journal*, 14(4), 13-24.

Wong, W. L. P. and Radcliffe, D. F. (2000), “The tacit nature of design knowledge”, *Technology Analysis and Strategic Management,* 12(4), 493-512.

Wright, P., McMahan, G. and McWilliams, A. (1994), ‘Human resources and sustained competitive advantage: A Resource-Based Perspective’, *International Journal of Human Resource Management,* 5(2), 301–326.

WEBSITE REFERENCES

Kontzer, T. (2002), “US Army ready to capture and build on information: knowledge management is central to the army mission”, Information Week, http://www.informationweek.com/news/showArticle.jhtml?articleID=6502092

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