A Review of Knowledge Management Strategies – Issues, Contexts and Benefits for the Construction Industry

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Abstract

In the last few years, knowledge management has become one of the hot topics discussed by scholars and industry practitioners. There is also an increasing awareness that to survive and maintain sustained competitive advantage in an uncertain and global market place, organisations need to give due consideration strategies that lead to effective knowledge management initiatives and outcomes. Despite the increasing in adoption of knowledge management concepts and initiatives in other industrial sectors, the construction industry has, arguably, been slow to adopt effective knowledge management practices and strategies; hence many construction organisations are yet to fully exploit the potential benefits of knowledge management concepts and initiatives. The main objectives this paper are, inter alia, to identify the importance and benefits of formal and informal knowledge management approaches in construction organisations and to critically appraise some of the strategies of knowledge management being adopted by organisations from which lessons learned are discussed for the benefits of the construction industry. The paper concludes that there are many knowledge management strategies currently being adopted and used by organisations and each having its own strengths, weaknesses, benefits and potentials. It also concludes that there is no one knowledge management strategy that is likely to lead to successful outcomes in all organisations, but there are certain issues worthy of consideration in developing a knowledge management strategy that offers potential for success. The realisation of this success will, however, depend on a host of factors, including organisational capabilities. This latter conclusion leads to important recommendations for the attention or industry, organisations and the academic community. These are also documented in the paper.

Keyword: construction organisations, knowledge management, strategies

1. Introduction

The ability of an organisation to manage their knowledge is one of the key factors to keep abreast with global market competition. Many concepts and approaches have been adopted to improve organisational performance, usually under fancy banners - total quality management, reengineering, right sizing, restructuring, cultural change, and turnaround - which have the same goal. The idea is to make fundamental changes in how business is done, in order to help cope with a new and more challenging market environment. It is now more crucial than ever for organisations to cope with changes and breakthrough, especially construction organisations, to survive and maintain sustained competitive advantage in an uncertain and global market place.

To move forward and become more resilient of outside pressures, construction industry players have to admit that they have to work collectively and come up with strategies that could cultivate sustainable business performance culture in construction organisations. One of the initiatives that are worth considering is to ensure that their organisations adopt knowledge management strategies in all aspects of the organisation. There is also an increasing awareness that to survive and maintain sustained competitive advantage in an uncertain and global market place, organisations need to give due consideration strategies that lead to effective knowledge management initiatives and outcomes (Egbu *et al.*, 1999). Better knowledge management offers construction organisations a possible mechanism for improving their performance to be ahead of tougher competitors, and its role as a tool of competitive advantage for construction organisation has been highlighted by several authors (for example see Kululanga et al. (1999); Egbu et al. (1999); Carrillo et.al (2000).

This paper is based on a thorough review of extensive literature of an on-going PhD study and is in the literature review stage. The main objective of this paper is to explore the relevant literature on the issues, contexts and benefits of knowledge management for the construction industry, in order to sustain a competitive edge. Since the study is about knowledge management, it is necessary to evaluate how the term knowledge is perceived in the current knowledge management literature. This part of the literature study also explains the features of different types of knowledge and evaluates the way information and knowledge differs from each other. Second, different approaches to knowledge management are presented. Third, this paper will highlight the benefits of applying formal and informal knowledge management approaches in construction organisations. It is hoped that the construction industry would use this paper as a reference point in their short and long term strategic planning. Some implications are drawn for practice, and the paper ends with a short conclusion on its contribution.

2. Main concepts of knowledge management

It is important to have a working understanding of the differences between data, information and knowledge, in order to understand what knowledge management is. Data is generally identified as a set of discrete facts about events (Davernport and Prusak, 1998). Most organisations capture significant

amounts of data in highly structured databases. The core value activity around business data is the ability to analyse, synthesis, and then transform the data into the information and knowledge. The concept of knowledge is different from information. Information, which can be attributed with facts about the real world, is the core of knowledge. Information is the outcome of capturing and providing context to experiences and ideas. Drucker (1989) states: "Knowledge is information that changes something or somebody, either by becoming grounds for actions or by making an individual (or an institution) capable of different or more effective action". This makes it clear that knowledge is naturally personal and intangible. Information, on the other hand, is tangible and available to anyone who is willing to find it. For knowledge to be of value it must be focused and current tested and shared. This caring for and sharing of knowledge has become one of the most debated topics in business. It is called 'knowledge management'.

The complexity of knowledge management is largely attributed to the fact that knowledge is multidimensional. Davenport and Prusak (1998) define knowledge as a "fluid mix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knower's. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices, and norms". Organisational knowledge could be classified further into tacit and explicit (Nonaka and Tekeuchi, 1995). Nonaka et al. (2000) defines explicit knowledge as the knowledge that can be expressed in formal and systematic language and shared in the form of data, scientific formula, specifications, and manuals and amongst a wide range of knowers. Explicit knowledge also can be captured and shared through technological means (Duffy, 2000). On the contrary, tacit knowledge is more subjective and experience based, not visible thus not easily expressed, communicated, understood or measured. Tacit knowledge is deeply rooted in action, procedure, routines, commitment, ideals, values and emotions (Nonaka et al., 2000). It is therefore important that organisations find means to encourage their employees to accumulate and share tacit knowledge which is a valuable strategic asset.

In recent development, one of the main functions of management is to create a synchronisation between data, information processing capacity of information technology and the creative and innovative capacity of human participants. Hence, Davenport and Prusak (1998) maintain that knowledge management is often used to describe the processes through which an organisation develops, organises, and shares knowledge to achieve its competitive advantage. KPMG Management Consulting (1999) understands knowledge management "as the systematic and organised attempt to use knowledge within an organisation to improve its performance." According to Mason and Pauleen (2003), the aim of knowledge management strategies is to facilitate learning and the creation of new knowledge by teaching individuals where to find appropriate organisational knowledge, the way to use and apply it effectively and to share and disseminate it appropriately. Bhatt (2001) states that knowledge management is a process which enables organisations to learn, creates, develop and apply necessary knowledge. The primary aim of knowledge management in any organisation is to tap knowledge from all members of the organisation and manage it to enable all members to share and access the resource without complication. These definitions

enable us to conclude that knowledge management basically involves the synthesis of diverse but supporting procedures, processes, technologies and fields of study needed to bring about a sustainable environment enabling knowledge to be celebrated and exploited to create value for the organisation.

Knowledge management is difficult to define in the context of construction industry precisely because of the lack of general consensus on a single unified meaning of the concept (Egbu 2004). However, according to Egbu and Robinson (2005), decisions on what knowledge a construction organisation needs or the knowledge intensity depends on the context of the business environment, i.e. key knowledge about process and people for delivery of its products. These context-based factors address issues of what is produced (product-goods/services), how it is produced (process) and by whom (people).

3. Knowledge management strategies and the construction industry

Knowledge management is becoming more important within the construction industry as it is deemed critical for construction organisations to gain competitive edge. It is particularly important due to the unique characteristics of its projects such as complicated nature of operations, multitude of occupations, professions and organisations, temporary team members and heavy reliance on experience, the one-off nature of the projects, tight schedules and limited budgets. Much effort has been taken within the industry itself and in the academic realm to develop a mechanism and strategy for managing knowledge within construction organisations and on projects. The issues addressed include knowledge accumulation, knowledge storing, and knowledge sharing and transferring. Despite these efforts, there is still very little understanding of the best ways to cultivate the sharing of knowledge and less on ensuring that knowledge is readily available to other individuals, project teams and organisations.

Awareness of the need to strategically manage employee-owned tacit knowledge within construction organisations in UK is currently high (Carrillo and Chinowsky, 2006). Soliman and Spooner (2000) argue that people within the organisation need to articulate every aspect of knowledge accumulation. Thus, knowledge management is crucial as the starting point in knowledge sharing, interaction and deciding the direction the organisation should take. The construction industry is one of the most people-reliant industrial sectors (Loosemore *et al*., 2003) due to its labour and skill-intensive nature but the management of people within construction organisations remains a complex and difficult issue (Dainty *et al*., 2002)**.** A study by Robinson *et al*, (2001) found that for construction organisations, the most important reasons for commencing knowledge management were: dissemination of best practices to key sets of employees, retention of the tacit knowledge of key employees, continuous improvement, the need for quick customer response and the need to share knowledge. Hence adopting knowledge management strategies in construction organisations will help to identify, create and disseminate knowledge of employees and customers and subsequently enhancing performance.

Organisations managed knowledge more or less intentionally. In recent years, a more intentional approach to organisational knowledge management has piqued both scholars and industry practitioners' interests. There are numerous approaches on knowledge management currently being adopted and used by organisations and each possesses its own strengths, weaknesses, benefits and potentials. The concepts are best defined according to how best organisations use them. There are two tracks of activities as follows:

1. IT tracks knowledge management or technologies centred. The IT track of knowledge management leverages on information communication technology to unify organisation knowledge assets. Today, there are several knowledge management solutions that are being developed and installed to speed the knowledge management practise. As referred by Velden (2002) this track is the first generation of knowledge management focusing on the ICT capabilities in managing organisation practices.

2. People track knowledge management or people centred. The people track knowledge management focuses on the organisational behavioural approach. ICT is an enabler and acts as a platform for expediting knowledge management practices.

Sveiby (2002) agrees that there are two tracks of knowledge management. The first track is the management of information approach. Researchers/practitioners in this cluster tend to have their education in computer or information science. They are involved in the development of information management systems, artificial intelligence, reengineering and group ware. This track is a new generation of knowledge management and is growing very fast. On the other hand, the people track which is considered as an old track and not growing so fast, involves those who have their education based on philosophy, psychology, sociology and business / management.

Mentzas et al (2001), however, classifies knowledge management approaches into process-centred approach and product-centred approach. Process-centred approach understands knowledge management as a social communication process. In this approach, knowledge is closely tied to the person who developed it and is shared mainly through person-to-person contact. The objective of information technology in this approach is to help people communicate knowledge, not to store it. Product-centred approach, on the other hand, focuses on knowledge documents, creation, storage and reuse in computer-based corporate memories. It is also referred to as "content-centred" approach."

Scarbrough *et al.* (1999) states two basic approaches to knowledge management, which is classified as 'supply driven' and 'demand driven'. Supply-driven initiatives identifies that the fundamental problem of knowledge management is concerned with the flow of knowledge and information within the organisation. The aim is to increase that flow by capturing, codifying and transmitting knowledge. Supply-driven initiatives typically have strong technological presence. Demand-driven approaches are more concerned with users' perspective, and their motivation and attitudes are seen as important.

Strategies within this category usually include reward systems and ways of encouraging knowledge sharing. Knowledge management strategies can also be described as either 'mechanistic' or 'organic' (Kamara et al, 2002). Mechanistic approaches rely heavily on technology and are concerned with the management of explicit knowledge. Organic approaches stress the importance of tacit knowledge management and include strategies such as storytelling and 'communities of practice'.

Most of the proposed approaches to manage knowledge can broadly be categorised into codification and personalisation (Hansen et al, 1999). Codification refers to the process of leveraging an explicit knowledge in databases so that knowledge can be shared and used by other people. It focuses on identifying, eliciting and storing knowledge in repositories, which makes that knowledge available for all. This strategy promises to support high-quality, reliable, and speedy reuse of knowledge. The downside is that it usually means separating the knowledge from its creators. The personalisation strategy emphasizes the process of leveraging tacit knowledge through direct personal contacts. Personalisation mechanisms are often thought of to be more ad hoc and informal, and codifications are perceives as formal and involve the use of electronic databases.

There are many ways to approach the development of a knowledge management strategy, as well as many ways of presenting the strategy document itself – there is no one magic formula for all. Larger organisations will probably need a detailed, formal strategy document whereas for a smaller organisation something briefer and less formal might be more suitable.

4. Benefits of formal and informal knowledge management in construction organisation

Knowledge management has been empirically proven to help the improvement of performance in the manufacturing industries in terms of the quality, time, speed and reliability while reducing production costs (Armstead, 1999). The potential benefits of knowledge management have been supported by a number of researchers, as a key capability which can generate sustainable competitive advantage (Skryme and Amidon, (1997); Davenport et al., (1998); McCampbell et al, (1999); Soliman and Spooner (2000). A literature reveals that the potential benefits of the knowledge management implementation are: (1) Improved decision-making, (2) Improved efficiency of people and operations, (3) Improved innovation (4) Increased flexibility to adapt and change, (5) Reducing process cycle times, (6) Reduce time to market (7) Sharing best practice, (8) Improved management learning.

Due to this success, many calls were made by the construction industry's leaders and academics for the adoption of knowledge management in construction industry. The implementation of knowledge management strategy can lead to the accruement of many benefits to organisations. Therefore, construction industry should take advantage to all the benefits of knowledge management initiatives. Some of the key benefits of knowledge management to construction sector organisations were highlighted by Anumba et al., (2005); Egbu (2004); Al-Ghassani et al, (2004); Carrillo et al, (2004) and Robinson et

al (2001). Among the benefits are: (1) Innovation, (2) Improved performance, (3) Improved construction project delivery, (4) Facilitate the transfer of knowledge across a variety of project interface, (5) Increased intellectual capital, (6) Better placed to respond quickly to clients' needs and other external factors, (7) Improved support for teams of knowledge workers, (8) Retain the tacit knowledge , (9) Increased value, (10) Construction organisations can be more agile and better able to respond to organisational changes, (11) To respond to organisational changes, (12) Risk minimisation .

Impressive benefits from knowledge management projects involve money saved or earned (O'Dell and Grayson, 1998; McCampbell et al, 1999). According to Clark and Soliman (1999), many of the benefits of knowledge management are intangible and difficult to quantify. Since traditional financial measure such as return on asset (ROA) or return on equity (ROE) cannot sufficiently evaluate the intangible aspects of organisational assets, such as knowledge or knowledge workers, several new approaches emerged. Intellectual capital is one of the measures receiving attention from academia and practice. (Edvinsson, 1997)

A number of reasons have been put to blame for the failure of the construction industry to fully benefit from knowledge management, and to improve organisation performance. A UK study done by Carrillo *et al.* (2004) on large construction organisations revealed four main barriers in knowledge management strategy; insufficient time, organisational culture, lack of standard work processes and insufficient funding. Dainty *et al.* (2005) highlight three principal barriers to the creation of a knowledge sharing culture and that organisations need to overcome these through an effective knowledge management strategy. The three principal barriers are: an unsupportive culture, poor communications structure and time constraints. Egbu (2004) also have carried out knowledge management research conducted a study on knowledge management issues in three empirical studies in construction organisations in the UK. In this study, he investigated the incoherent and lack of ownership of knowledge vision in the industry. There was a prevalent lack of appreciation of knowledge as an important asset. Other reasons include the insufficient promotion on information-sharing culture by organisations and lack of appropriate methods and tools for measuring and valuing knowledge. In addition, there were inadequate standardised processes put in place. There was evidence of inflexible organisational structures, time constraints and enormous pressure on key staff (knowledge "experts"). There was an endemic reluctance to, or fear of, the use and application of IT tools for knowledge management (technophobia). Some members of the industry only see the "knowledge is power syndrome" and not the "law of increasing returns" associated with knowledge creation whereby shared knowledge stays with the giver while enriching the receiver Egbu (2004). Overall, there was a lack of a clear purpose or shared language and meaning of knowledge management in the industry.

The literature has found several studies that proposed several key variables for successful implementation of knowledge management. According to knowledge management study of 31 projects in 24 companies conducted by Davenport et al. (1998), they have identified knowledge management success factors such as (1) having a knowledge-friendly culture (2) creating an organisational infrastructure that systematically

support knowledge management (3) motivated workers who develop, share and use knowledge; (4) balance of flexibility, evolution and ease-of-accessibility to knowledge; (5) shared knowledge; (6) means of knowledge transfer using various information technology infrastructure; and (7) senior management support and commitment. Ryan and Prybutok (2001) propose five success factors such as (1) an open organisational culture; (2) senior management leadership and commitment; (3) employee involvement; (4) teamwork and (5) information systems infrastructure. Perhaps the most comprehensive list of success factors has been presented by Moffett et al. (2003). Ten key components to successful knowledge management were identified: (1) a friendly organisational culture; (2) senior management leadership and commitment; (3) employee involvement; (4) employee training; (5) trustworthy teamwork; (6) employee empowerment; (7) information systems infrastructure; (8) performance measurement; (9) benchmarking and (10) knowledge structure. In a similar study, Alavi and Leidner (1999) invited a non-random sample of 109 participants from 12 different countries to participate in a survey that aimed to define the concept of knowledge management that managers ascribe to the concept of knowledge management. When asked what capabilities their organisations needed for successful knowledge management, three perspectives emerged: an information-based perspective, a technology-based perspective, and a culture-based perspective.

5. Recommendations for the attention of industry, organisations and the academic community

A properly developed knowledge management strategy provides a unique opportunity to gain a greater understanding of the way the organisation operates, and the challenges that it faces. From the literature, it is suggested that there are certain issues worthy of consideration in developing a knowledge management strategy that offers potential for success and adds a competitive edge to any given organisation. If proper and timely identification of the needs and issues of an organisation's staff is done, activities and initiatives can be recommended with the confidence that these will have a clear and measurable impact upon the organisation.

5.1 Create a change management plan

For many organisations, knowledge management represents a cultural change, and employees need to know that top management/leader is behind this change and that it is an ongoing way of life for the organisation. Construction industry may need a change management plan to do jobs differently. The change management plan specifies how to gain acceptance of knowledge management within the organisation. As part of the overall change management plan it is needed to update job descriptions, feedback sessions and performance reviews to reflect the new workflow. Neglecting to make these changes is likely to create friction.

5.2 Knowledge sharing Culture

Culture is not only a challenge faced by construction organisations. In a survey of 431 US and European organisations, culture was found to be the biggest impediment to knowledge transfer (Ruggles, 1998). Understanding the culture of the organisation is the first step that needs to be taken before implementing the initiative. The types of culture present in an organisation affect the ways in which knowledge is managed, and can, as a result either persuade or discourage the use of knowledge management practices. For successful knowledge sharing, organisations first have to have a culture that is open and accept sharing. "Stoddart (2001) argues that knowledge sharing can only work if the culture of the organisation promotes it". Studies by De Long and Liam (2000) show that culture influence knowledge sharing by as much as 80%. Egbu *et al.* (2003); Egbu and Robinson (2005) provide a list of various aspects of organisational culture that would support a knowledge management effort and simultaneously recognise the various aspects of culture that may affect an organisation negatively.

5.3 Top management commitment

Top management has the greatest power in enabling and moving knowledge management in the organisations. They have the ability to influence the other success factors, such as enabling a knowledge-friendly culture, encourage collaboration across boundaries of structure, time, and function. They could disseminate success stories, provide infrastructure and support, and change the reward system to remove barriers. Top management also will need to consistently spread a message of sharing and leveraging knowledge for a grater good (O'Dell and Grayson, 1998). As such, the knowledge management activities of the construction organisations could be implemented more meaningfully if their top management is willing to play a greater role in driving it and setting a good example.

5.4 Reward system to encourage knowledge sharing

Knowledge sharing is not necessarily a natural process. Thus, initially in implementing knowledge management, a proper reward system that credits sharing must be established. Rewards and recognition scheme is needed in order to motivate people to share their knowledge. A reward system that appreciates and shows recognition of the efforts of the employees either in fair monetary or non-monetary terms helps to motivate the employees to remain loyal and contribute to the knowledge management process within the organisation. However, the construction organisations must ensure that the reward system is on long-term basis, and not short-term so as to avoid the employees in gaming the system for the rewards. This can create interest, excitement and motivation among people, and ensure early adopters get high visibility so they serve as role models for others. Construction organisations need to support employees or teams that invest or "give up" resources that make this sharing happen especially if they do not directly benefit. Top management can help buy promoting, recognising and rewarding people who model knowledge sharing behaviour, as well as those who adopt best practice (O'Dell and Grayson, 1998). Therefore, the

staffs of the companies are indirectly being encouraged by the organisation to increase the knowledge within the companies through these support systems.

5.5 Establishing Technology Platform

A technology platform composed of its infrastructure and applications must support the wide variety of need that arises. IT can provide an edge in harvesting knowledge from piles of old buried data repositories. This is supported by Offsey (1997) who states that IT is clearly required to enable the organisation's knowledge management processes. The rise of networking computers not only expands the range of knowledge sharing also reduces the cost of transferring knowledge. Both explicit and tacit knowledge are created and retained in databases through technologies. Therefore this knowledge can be shared among the employees and would be easily accessible. This would contribute to greater efficiency and better improvement of organisations performance. ICT helps to pool experts in each of these processes into communities and facilitates collaboration among members of these communities. Al-Ghassani et. al. (2005) present a various available knowledge management tools and distinguishes between knowledge management techniques and technologies to choose from in implementing a knowledge management strategy.

5.6 Training

The human resource department of construction organisations should take the responsibility for teaching the change in mindset required to implement knowledge management and to help their employees gain more knowledge. More training will cultivate the interest and responsibility in the employees to keep their education current. Through training, it is believed that employees would gain the latest knowledge available in the market, making the staff more adaptable to the changing environment of construction industries. The use of a knowledge management strategy combined with training may produce some interesting and satisfying results.

5.7 Human Resource Practice

Human resource strategy needs to bring people together so that they can build informal networks (Lubit, 2001). A knowledge management strategy must be part of the most important human resources effort as its success relies on being incorporated into the recruitment and selection process, staff learning and development, the performance management and rewards system, as well as being part of mobility and reassignment. Armstrong (2000) thought of the role of human resource in knowledge management as "to facilitate the dissemination of learning through workshop, projects and conference and later, to take responsibility for co-ordinating the preparation of business plans which incorporate the outcome of the learning activities". The main tasks of human resource management are to monitor measure and intervene in construction, embodiment, dissemination and use of knowledge by the employees (Soliman and

Spooner, 2000). Knowledge management strategies must put emphasise on enhancing and focusing on human interactions and human resources.

6. Conclusion

It was clearly presented in the literature that knowledge management strategy has become a competitive factor in the construction industry. This paper outlined basic introduction to the knowledge management concepts and knowledge management approaches that are in practice, and also highlighted the issues that researchers thought as vital in the progress of knowledge management research agenda. Following a brief review of the opportunities and challenges that exist within the construction industry when taking up knowledge management initiatives, the paper identified the benefits and importance of knowledge management to construction organisations. Regarding this, the paper suggests the use of knowledge management strategy as a promoter of organisation improvement. Challenges await in the implementation of knowledge management and organisations need have strive hard to be relevant in anticipating the resurgence of new areas of knowledge management. This paper could serve as a foundation for future studies but more work needs to be done to establish approaches in managing knowledge in construction organisations. The continuing stages of this ongoing study involve developing a conceptual framework and conducting a main study.

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