The Significance of Knowledge Management in Civil Engineering Construction Firms in Nigeria

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ABSTRACT

The knowledge generated during the construction phase of the projects are lost as a result of lack of awareness of the benefits derived in knowledge management (KM) practice by the professionals of the civil engineering (CE) construction firms. Therefore, the paper evaluates the significance of KM practice in the CE construction companies. The research methodology adopted was the questionnaire survey approach as a result of complexity, fragmentation and diversification of CE construction companies. A total of three hundred (350) numbers of questionnaires were distributed to Engineers, Quantity surveyors, Architect, Foreman, along with other employees across the participated CE construction companies. The descriptive and T-test analysis were employed to analyze the data obtained from the respondents. The results show that the KM practice improves the construction organizational performance in terms of project delivery, reduce construction reworks, improve problems solving solutions and decision making etc. The paper suggests that the CE construction companies should develop proactive management strategies that facilitate the practice of KM. In addition there is a need to create awareness of the benefits of KM practice in the CE construction companies through workshops, seminars and mentoring and coaching.

Key words: Construction organization, Knowledge, Knowledge management; project knowledge; knowledge sharing; and knowledge capturing.

Introduction

Knowledge is now regarded as management assets within the construction organizations, since it facilitate the organizations to improve their competitive advantage (Kant and Singh, 2011 and Kasimu et al., 2012). Therefore, failure to manage knowledge effectively would increase the risk for lack of organization priceless inspiration and creativeness (Coulson and Thomas, 1997). Laudon and Laudon, (2003) stated that knowledge is progressively considered as a survival tool in a dynamic and competitive environment. Malone, (2004) added that knowledge has now turned into a precious property and KM continues to be broadly practiced by many organizations as one of the most promising approaches for the organization to be becoming successful within the information age. However, many researchers and scholars has now recognized KM as one of the prerequisites to turn a construction organization into a centre of excellence for the development of infrastructure projects and innovated with high moral values in order to meet the national and international needs (Abdul-Rahman and Wang 2010; Alashwal, et al. 2011; Chou and Yang 2012).

Therefore, KM has received much attention in the construction sector recently in line with the quantity of researches carried out through numerous relevant articles and books released, as well as the accessibility to reviews of effective cases in different levels in its implementation in construction organizations. Drucker, (1993) asserted that the significance of KM continues to be recognized and it is frequently associated with the emergence of the knowledge economy. Within the knowledge economy, knowledge is stated to sideline both capital and labour to become the ‘sole factor of production’ which influences organizational capability to sustain its competitive advantage (Nguyen et al., 2009). In order to remain competitive, the critical innovation and skill to respond to clients rapidly is also dependent on the quantity of knowledge available. Drucker (1993) shared his view that, the fundamental economic resource is no more capital, natural assets, nor work, but knowledge. There is a pressing need in each every knowledge-intensive organization for knowledge to be well managed in order to cope with the shortcomings in the common uneven distribution of knowledge in the organizations. Therefore, the developing nations especially Nigeria that is yet to completely exercise the KM practices and comprehending the relevance of KM within the CE construction firms have to rise up to cope with the developed nations by mapping out a strategy/policy that would facilitate the management of knowledge, best practices and experiences of experts and engineers in the CE construction firms. The paper aimed at evaluating the significance of KM practice in the CE construction companies. This will provide a platform that clarifies the
needs of KM practice in CE construction companies. The above aim is achieved through the accomplishment of the following objectives:
1. To establish the benefits of KM practice in the CE construction companies.
2. To examine the level of the benefit of KM practice in the CE construction companies.

Literature Review:

Knowledge management:

According to Davenport et al., (1998) KM is a procedure for collection, distribution and efficient utilization of the knowledge resource. Disterer (2003) added that KM is the creation, acquisition, capture, discussing and use of knowledge in almost any forms to improve the organization performance. O’Dell and Grayson, (1998) argued that KM is an approach employed by organizations to ensure that knowledge reach the right people at the proper time, and that those people share and use the knowledge to improve the organizational performance. Bhatt (2001) stated that KM is a procedure for knowledge creation, validation, presentation, distribution and application. However, Bounfour, (2003) asserted that KM is a method, infrastructures, and technical and managing tools, made to create, share and leverage information and knowledge within and around organizations. Although the above ideas of researchers vary within their description of KM, there appears to become a consensus to deal with KM as a process permitting use of knowledge as a key factor to generate and add value (Kasimu et al., 2013 and Makama, 2012). From the perception and explanations of the aforementioned researchers and scholars KM is defined in this paper as a process of creating, capturing, storing, sharing, reusing and updating knowledge in an organization. Figure 1 summarized the definition in rectangular form as shown below.

\[\text{Fig. 1: The knowledge management framework.}\]

Knowledge management in the construction organizations:

Many scholars and researchers have discussed about the functional influences of KM in the construction organization. For instance Kamara et al., (2002) outline the main significant influence of KM in the construction organization as a result of the need for innovation, improved organizational performance. In addition, Carrillo et al., (2004) conducted a research in the UK engineering and construction firms, and discovered the reasons for KM practices in the construction organization as the necessity to inspire continuous improvement, in order to share valuable tacit knowledge, to disseminate best practices, to respond to clients rapidly, to reduce construction rework, and to develop new products and services respectively. Therefore, considering the character of construction organizations and construction projects in terms of uniqueness and temporary in nature, and have the employees from the different or multidisciplinary team that has to interact to offer the construction project goal. The professionals when completing a task, they move to a different project in the same organization or a different organization or sometimes they proceed to another project, resign, or retire. Therefore, the new knowledge and experiences acquired by the professionals are lost after completing the projects, and if the organization did not recorded, captured is stored within the repository to be shared for reuse in the subsequent projects (Kazi and Koivuniemi, 2006 Fong and Wong et al., 2005). This is because the tacit knowledge and experiences are in the minds of engineers and experts that are actively participated in the construction projects. However, researchers and scholars intensified that capturing the tacit knowledge of experts and engineers that take part in the project development for re-using in future projects is vital for the

Challenges for knowledge management in construction firms:

Carrrillo et al., (2004) outlined the main challenges faced in applying KM in construction companies, such as lack of sufficient time; organizational culture; insufficient standard work processes and inadequate funding. However, lack of sufficient time continues to be a significant challenge especially when companies expect employees to take additional responsibility for KM activities to their normal duties. In such scenarios knowledge sharing might not appear like a main concern unless individual performance metrics incorporate them. Organisational culture was regarded as challenges. Many authors have recognized culture as a significant barrier to knowledge sharing practices (Ruggles 1998 McDermott and O’Dell 2001 Moore and Dainty., 2001). Dainty et al., (2004) stated that the task for KM is to inspire people to make a decision to voluntarily share tacit knowledge among the colleague within the organization. Even though the organizational culture continues to be blamed for that problem when it comes to vertical silos in organizations which result in a lack of knowledge of the items and others did, a culture of internal competition which undermines efforts to share knowledge, knowledge hoarding, etc. Insufficient standard work processes are concerned with large organizations where, in some instances, they’ve grown quickly and there are no more standard methods resulting in different approaches being adopted. Lower the profit margin of construction organizations as well as their conservative character also has brought to reluctance to invest in KM initiatives and the infrastructure support needed. What companies have finally recognized is the fact that KM cannot be solved by information technology (IT) alone because it ignored the sharing of tacit knowledge that’s very important for improvement of construction organizations’ expertise

Fig. 2: The mode of KM practice during the construction projects.

Benefits of km in construction organization:

Robinson et al., (2004) outlined that KM has been empirically established to improve the performance of the construction industry in terms of the quality, time, speed, reliability and reducing production costs. However, the possible benefits of KM have been supported by many researchers, as a key competence that generate sustainable competitive benefit (Skryme and Amidon, 1997; Davenport et al., 1998; McCampbell et al, 1999; Soliman and Spooner, 2000). Most of these research revealed that the potential benefits of the KM implementation are: improved decision making; improved efficiency of people and operations; improved innovation; increased flexibility to adopt and change; reducing process cycle times; reduce time market; sharing best practices; improved management learning. Moh, d Zin and Egbu., (2010) stated that due to this success, many calls were made by the construction industry leader and academics for the adoption of KM in the construction industry. Anumba et al., (2005) added that the implementation of KM strategy can lead to the agreement of several benefits to organizations. Some of the key benefits of KM to the construction industry
were highlighted below by the following researchers (Anumba et al., 2005; Egbu, 2005; Al-Ghassani et al., 2004; Carrillo et al., 2004 and Robinson et al., 2005) such as: innovation; improved performance; improved construction project delivery; facilitate the transfer of KM across a variety of project interface; increased intellectual capital; better placed to respond quickly to client’s needs and other external factors; improved support for teams of knowledge workers; retain the tacit knowledge; increased value; construction organizations can be more responsive and better able to respond to organization changes; to respond to organization changes and; risk minimization. Extraordinary benefits from knowledge project involves money saved or earned O’ Dell and Grayson, 1998; McCampbell, et al., 1999). Beckman, (1997) added that, the majority of the benefits of KM is intangible and difficult to quantify. In view of the fact that traditional financial measure such as return on asset (ROA) or return on equity (ROE) cannot adequately evaluate the intangible aspects of organizational assets, such as knowledge or knowledge workers, several innovative approaches emerged. Intellectual capital is one of the measures that receiving attention from academia and practice (Davenport and Prusak, 1998). A number of reasons have been put to blame for the failure of the construction industry to fully benefit from KM.

Methodology:

The method:

The research methodology adopted for this study is a questionnaire survey, because questionnaire survey is the field that studies the sample of individuals from a population with a view towards making statistical inference about the population using the sample (Groves et al. 2009). It also pulls out about public opinion, such as beliefs, perception, ideas, views and thought about some things. However, questionnaire survey is used for scientific purposes. Its provide important information for all kinds of research fields, example about the current situation on the ground, psychological perception and views of the population. However, the CE construction firms in Nigeria being one of the biggest construction sectors in the construction industry, with different categories such as multinational, national and local construction companies scattered all over the country. These categories of CE construction companies have different professionals with different kind of knowledge and work jointly to produce the product of the companies and sometimes these professionals were in different workplaces. Therefore, in order to obtain the data required for the research work, a survey questionnaire was adopted as a result of the complexity, fragmentation and diversification of the CE construction companies.

Population and sample techniques:

To obtain the require population for this study, the CE construction companies were divided into three categories as stated above: multinational CE construction companies (foreign companies that actively participates in CE construction projects); national CE construction companies (indigenous companies that operates in every part of the country with many branches) and local CE construction companies (local companies that operates within a community or a state). This division was to facilitate the right selection without bias. Therefore, the stratified random sampling technique was adopted for selection of the CE construction companies that participated in this research work. Thirty five (35) CE construction companies that fully participated in the CE construction projects were selected for the questionnaire survey. A total of three hundred and fifty (350) numbers of questionnaires were distributed to Engineers, Architecture, Quantity Surveying, Builders, Project manager, Information manager and others experts across the selected CE construction companies. However, 72.29% of the questionnaires distributed were filled correctly and returned; 12% were filled wrongly and returned, whereas 15.71% were not returned. Then, 72.29% of the questionnaire returned represented the two hundred and fifty three (253) questionnaires that were used for the descriptive analysis.

The questionnaire designed:

The questions in the questionnaire were designed based on the following items considered as a measurement of the CE construction organizational performance. Namely improvement in project delivery process in term of quality, improvement in economic profitability, improvement in problem solving and decision making, improvement in project delivery process in term of cost and time, reduce construction rework problems, enhancement of company’s competitive advantage and enhancement in personal capability etc. The questionnaire that was used to record the responses of each respondent contained mainly closed ended questions using a five- point Likert scale ranged from very high (1) to none (5). However, the scores of the respondents were computed based on the responses of the research participants.
Analysis of data:

The starting point in data analysis was to convert the raw data recorded in the questionnaires into numbers and arrange them into SPSS version 18.0 databank for the analysis. Descriptive analysis was used to analyze the data collected from 253 participants in the CE construction companies. However, the mean statistic was used to simply the arithmetic average of the values in the set, obtained by summing the values and dividing by the number of values. In addition the standard deviation was used for summaries the measure of the differences of each observation from the mains. The T-test analysis was conducted to validate the outcome of the results of the descriptive analysis on the significant influence of the benefits derived on KM practice in organizational performance. The reliability test was conducted to confirm the reliability and validity of the statistical data, and also the internal consistency method was adopted for the cronbach alpha reliability coefficient.

Presentation of the Results:

Discussions of the results:

The results obtained from the descriptive; T-test analysis and Cronbach alpha test were summarized in tabular form for clear understanding. The result was presented in tabular form as shown below

Table 1: The reliability and validity of data.

<table>
<thead>
<tr>
<th>KM items measured</th>
<th>Cronbach’s Alpha</th>
<th>Cronbachs Alpha based on standardized items</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits of KM on the construction firms</td>
<td>0.789</td>
<td>0.794</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 1 shows the cronbach’s alpha values obtained from the benefits of KM practice in the CE construction firms is 0.789. This implies that the data is very statistical significance. This is because cronbach’s coefficient has a value of more than 0.5 (Nunnally, 1978) and 0.7 (Nunnally and Bernstein, 1994), which is regarded as satisfactory for such exploratory work. This indicates that there is a high degree of internal consistency in the responses of the participants.

Table 2: The benefits of KM practice in the CE construction companies.

<table>
<thead>
<tr>
<th>Items measured</th>
<th>Mean N=253</th>
<th>Std. Deviation</th>
<th>Ranks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce construction rework problems</td>
<td>3.12</td>
<td>1.207</td>
<td>1</td>
<td>They mean value is higher than the average mean value of 2.66 (Exploitive)</td>
</tr>
<tr>
<td>Improvement in problem solving and decision making</td>
<td>2.95</td>
<td>1.100</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Enhancement of company’s competitive advantages</td>
<td>2.84</td>
<td>1.201</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Improvement in economic profitability</td>
<td>2.82</td>
<td>0.890</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Improvement in the ability to respond to market and client needs</td>
<td>2.78</td>
<td>0.987</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Improvement in problems solution</td>
<td>2.73</td>
<td>1.005</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Improvement in project delivery process in term of cost</td>
<td>2.65</td>
<td>0.895</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Improve experience of sharing problems</td>
<td>2.64</td>
<td>0.975</td>
<td>6</td>
<td>They mean value are less than the overall average mean value of 2.66 (Explorative)</td>
</tr>
<tr>
<td>Improvement in project delivery process in term of quality</td>
<td>2.60</td>
<td>0.841</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Enhancement in personal capability</td>
<td>2.58</td>
<td>0.935</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Improvement in bidding performance</td>
<td>2.49</td>
<td>0.832</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Reduce unnecessary costs</td>
<td>2.43</td>
<td>0.984</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Improvement in project delivery process in term of time</td>
<td>2.38</td>
<td>0.859</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Improvement in work efficiency</td>
<td>2.26</td>
<td>0.801</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Overall mean and standard deviation</td>
<td>2.66</td>
<td>0.829</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2 shows 2.66 and 0.829 respectively as the overall average mean and standard deviation of the fourteen (14) benefits derived from the KM practice in the CE construction firms. However, from the Table 2 it is glaring that exploitive items are the major benefits derived from KM practice in the CE construction firms, since their mean value is higher than the average mean value of 2.66. Whereas the explorative items are less benefits derived, since their mean value is less than the average mean value of 2.66. These results were also used to conduct the T-test analysis in order to establish more facts about their levels of significance to CE construction firms.

| Exploitive  | 47.892 | 7 | 0.000 | 2.79143 | 2.6488 | 2.9340 |
| Explorative | 58.765 | 7 | 0.000 | 2.47000 | 2.3620 | 2.5780 |

Table 3: Sample T-test.

Table 3 shows the results of the T-test conducted to determine the level of benefits derived from KM practice in CE construction companies. However, the result shows that the benefits derived from the KM application in the CE construction companies listed under the exploitive have more significant influence on organizational performance with the P value of 0.00<0.05 and have the value of 95% level confidence as lower 1.8384 and upper 1.9302 respectively. Whereas the benefits derived from KM practice in the CE construction firms listed under the explorative have the less significance influence on organizational performance with the P<0.05 and have the less value 95% level of confidence as lower 1.7310 and upper 1.7976 respectively compare to exploitive.

Findings from results:

The results obtained from both the descriptive and T-test analysis on the significance of KM practice in the CE construction companies shows that the practice of KM improves the organizational performance to face the challenges of global competitive environments. Therefore, the results obtained from the analysis shows the followings as benefits of KM practice in the CE construction companies.
- Reduce construction rework problems
- Improvement in problem solving and decision making
- Enhancement of company competitive advantages
- Improvement in economic profitability
- Improvement in the ability to respond to market and client needs
- Improvement in problems solution
- Improvement in project delivery process in term of cost.

Accordingly, the above findings signify that KM practice is a vital resource to the construction organization. Nevertheless, the CE construction firms in Nigeria have belittled because of lack of innovation, improvement in the construction process and also improvement in organizational efficiency and effectiveness. Therefore, the CE construction firms should take advantage of the benefits of KM initiatives by practicing KM to facilitate sharing of knowledge and professional experiences among the employees to prevent the repetition of the same mistakes and errors of the past projects and also problems that already solved from re-surface again. This result was supported by Bhatt, (2001) that KM provides every individual the capability for comprehending the possible ways of handling different situations and anticipate implications and methods for improvement. Similarly this result was supported by researchers and scholars that KM is a means of determining and exploiting corporate individual knowledge assets, individual experiences, lesson learnt and best practice (Whetherill et al., 2002; Mohammed and Anumba 2005). KM in construction projects promote a built in approach as mentioned above to create and capture, retrieval and use of the professional knowledge area of services, products and processes.

Conclusion:

The significance of KM practice in the construction companies is very imperative as knowledge, best practices and experiences are scattered over different processes, trades and people in different construction projects and in different organizations. The results of the analysis show clearly that KM practice in the CE construction firms enhance the construction organizational performance in many ways as mention in the findings. Therefore, the practice of KM is now regarded as significant since it improves the project delivery in
terms of cost, time and quality; reduce reconstruction works; reduce time and cost overruns in the construction projects; reduce repetition of problems that have already solved and enhance the competitive bidding. For this reason the paper suggests that the CE construction companies in Nigeria should develop proactive management strategies that facilitate the practice of KM. There is a need to create awareness of the benefits of KM practice in the CE construction companies through workshops, seminars and mentoring and coaching. The senior management of the CE construction companies should motivate the professionals by showing commitment to KM practice through social interaction, project brief stage, and at the site meeting in order to stimulate the practice of KM. The government should create conducive environment for the CE construction companies to facilitate the practice of KM especially in the area of infrastructure like ICT facilities, technological tools and funds,

References


