

Professional Perspectives on Factors Influencing the Capture and Reuse of Project Knowledge in the Nigerian Construction Industry

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Abstract

The construction industry's struggle to align with the knowledge economy has resulted in underperformance, as meeting client expectations for cost, quality, and timeliness becomes challenging due to project knowledge loss. This study aims to identify factors contributing to valuable knowledge loss in construction projects, caused by inadequate knowledge management practices. Objectives include identifying and evaluating factors affecting project knowledge capture and reuse through literature review and assessing construction professionals' perceptions. A quantitative approach employing a questionnaire survey was adopted, with a sample of 209 firms selected from a population of 1,962 registered construction firms with the Cooperate Affair Commission (CAC) in Abuja. Self-administered questionnaires were used for data collection, employing simple random sampling. Descriptive analysis using SPSS identified factors influencing project knowledge capture and reuse, including personnel changes, the need for standardized knowledge capture and sharing platforms, employee retirements and transfers, the perception of knowledge as a competitive edge, outsourcing, organizational culture, team separation after project completion, motivation, self-confidence, and death. Findings highlighted the significance of standardized knowledge capture and sharing platforms (Mean=3.90) and team separation after project completion (Mean=3.86) in affecting project knowledge capture and reuse, as reported by construction professionals. Therefore, this study concludes that establishing standardized knowledge management platforms and effectively managing team separation after project completion are crucial for preventing knowledge loss. Construction firms are recommended to prioritize the establishment of standardized platforms to enhance project performance and mitigate knowledge loss.

Keywords: Project knowledge, Capture, Reuse, Construction Industry, Organisation.

INTRODUCTION

The construction industry according to Anumba *et al.* (2005) is described as a knowledge-based industry and knowledge is what characterizes a knowledge-based industry. Knowledge is seen to represent strong support for building personal and organisational competitive advantage, and therefore construction industry must try hard to effectively make use of knowledge for creating value and achieving business objectives. Business success is decided by the knowledge added to products and the value it creates (Lin and Wei, 2005). It could be stated that the construction industry is highly knowledge intensive but could have been unsuccessful to resourcefully employ the knowledge of the employees and the organization as a whole and much of an organisation's valuable knowledge walks out the door at the end of the day, Dalkir (2005). This is as a result of

loss of knowledge during developmental stages of projects such as the initiation stage, planning and design stage, and construction and execution stage.

Knowledge that supposed to have been built on earlier knowledge acquired, to get rid of costly redundancies and avoid making at least the same mistake have not been fully leveraged (Kasimu *et al.*, 2013; Dalkir, 2005), leaving construction company to reinvest in the wheel. According to Kasvi *et al.* (2003) identification of critical knowledge and the ability to utilize it is a challenge for project organisation such as the construction industry. Egbu *et al.* (2003) highlighted that that only 20% of knowledge available to an organization is actually used. It leads to intuitive thinking of about the remaining 80% of the employee's knowledge.

Therefore, the aim of this paper is to address problem associated with the capture and reuse of project knowledge in the Nigerian construction industry. The specific objectives were to identify the various factors affecting the capture and reuse of project knowledge through literature reviews and also to assess the construction professional's perception on various factors identified. Knowledge management has long been in existence, frequently KM is being used in different forms by People such as knowledge acquired from a large-scale social interaction and through working together for knowledge transfers (Poyhonen, 2005). The practice of knowledge management in the construction industry is not a one-off investment according to Hari *et al.* (2004). It's an investment that needs steady attention over an extensive period of time. Dalkir (2005) stated that one of the major attributes of Knowledge management (KM) relates to the fact that it deals with knowledge as well as information. Another feature of knowledge management (KM) over information management is the ability of knowledge management (KM) to address knowledge in all types, especially, tacit knowledge and explicit knowledge.

In order to do well in the labour market of the future, the construction industry will have to be seen as the most advanced knowledge-based industry. Construction Company with good management position is more likely to have an increase in its workers performance (Armstrong, 2006). People being the central part of the organisation makes management of people a subject of concern to organisations performance than management of materials, money or plant. People can use resources in a way that resources cannot act on people (fryer, 1996). Knowledge management can improve people performance which can be influenced by their ability to proffer solution to problems (Anumba *et al.*, 2005).

Project Knowledge

According to Oke *et al.* (2013), several researchers have acknowledged the current limitations to managing of information and knowledge relating to construction project. According to Stanescu and Filip (2009), knowledge is generated in heterogeneous environments such as the construction industry and knowledge reuse represents a real challenge for the decisional space. Fong (2005) explains knowledge in projects as that knowledge, which is present in a project such as documentations, discussions and project management system. Projects' knowledge is required for project execution. This knowledge includes project organisation design, designing, planning, controlling, project marketing and skills management.

Dave and Kossel (2010), highlighted that construction industry is characterized by construction projects that are fragmented and ad-hoc in nature. This makes the capture and reuse of valuable knowledge gathered during a construction project to pose a challenge. Hari *et al.* (2004) stated that

the capturing of knowledge within an organisation helps in solving of problem, managing change, organisational learning, succession planning and innovation. Knowledge management is mainly referring to the need to capture knowledge.

According to Anumba *et al.* (2005), project knowledge is described as knowledge including data that is required to conceive, develop, realize and terminate a project. Kamara, Anumba, and Carrillo (2005), also explained that the characteristics of projects affect the nature in which knowledge is managed within and between the projects. The changing nature of the project organisation consequently will have implication on Knowledge management (KM) across the lifecycle of a project. In the construction industry re-use of project knowledge is identified as a challenge as knowledge is not often available for general reuse in subsequent or new project (Anumba *et al.*, 2005). Knowledge produced during socialization and interactions are not adequately captured. This knowledge is implicit in nature and constituent what makes project knowledge (Dalkir, 2005).

Knowledge Reuse

According to Dalkir (2005), reusing knowledge involves recall and recognition. Reusing knowledge typically begins with the formulation of a search question. Knowledge reuse has proven not only to increase efficiency and effectiveness but help knowledge workers to devote their efforts to inventive and knowledge to be added to corporate memory, as opposed to reinventing what has already been developed or solved.

Knowledge Capture

According to Dalkir (2005), construction project usually involves professionals and craft persons coming to interact in other to deliver a construction project. Knowledge generated during such interaction needed to be captured as it is one of the basic purpose of KM. Knowledge capture is focused on in this study because it has been highlighted as the most challenging element of knowledge management as identified by Hari *et al.* (2004), in a study carried on construction industry. It was also observed by Brooking cited in Egbu, Hari, and Kumar (2003) that only 20% of knowledge generated in an organisation are actually captured and put in use leaving 80% of such knowledge to a question of it usage. In a study it was observed that 67% of the responses gotten on the extent to which the knowledge management element is a challenge indicate knowledge capture as the most challenging.

Knowledge capture process

Approach for Knowledge capture consists of six stages as identified by Schulz and Jobe cited in Hari *et al.* (2004). Stage one is to recognise the knowledge to be captured which involve understanding the core business strategy of an organisation and stage two is to examine knowledge captured if they are appropriate to strategic knowledge requirement of organisation such as construction firms. Stage three is to implement appropriate techniques and technologies for knowledge capture and stage four is to filter the knowledge. The last two stages is to bank the knowledge and disseminate the knowledge.

Factors affecting the capture and reuse of project knowledge

Knowledge from projects is the experiences documented from completing a project. Usually, it can be in the form of best practices, lessons learned, post-project reviews or after-action reviews. Due to the temporary nature of project people are pulled out from a project before it is actually executed, leaving valuable lesson learnt from the project not recorded and therefore being lost

(Koenig and Srikantaiah 2004). However, some researchers have highlighted possible factors affecting the capture and reuse of project knowledge. According to Egbu *et al* (2003), knowledge can be lost when not captured through retirement, downsizing, Organisation culture and outsourcing. Sodiya, *et al.* (2006), found out that tacit knowledge is always lost through the following means: Employees leaving, Employee been transferred and retiring and at the end best practices and lessons learned are not being captured and utilized effectively.

Anumba *et al.* (2005) stated that tacit knowledge of an organisation can be lost when KM practice is not giving priority through the following means: Employees leaving, Retirement and Death of employee. Dalkir (2005) added that Organisations find it difficult to manage knowledge. However, it is essential to identify that knowledge that is of value and is also at risk of being lost to the Organisation. It is highlighted that such knowledge can be lost through the following means: Retirement, Turnover, Personnel changing companies or industry, Teams being separated after completion of a project, Lack of a standard platform to capture and share knowledge and Competition using the intellectual capital.

Rabiu (2009), highlighted that if employee retirement and resignation rate is not properly managed its impact could be disruptive to the business. Tan *et al.* (2010) highlighted that lack of self-confidence is another factor that affect the capture and re-use of project knowledge since employee are sometimes not sure of what to share. People sometimes view knowledge as personal belonging and are not willing to share it instead they hoard it for personal use. According Dalkir (2005), this kind of action is displayed as viewing Knowledge as power. Frost (2010), highlighted that project knowledge can also be lost through poor organisational structure and lack of motivation to share knowledge.

METHODOLOGY

Research Method

The methodology of any research is the process used to collect information and data for the purpose of making a contribution in area of study. The research methods adopted for this study is in form of quantitative research which seek respondent responses in an attempt to examine the status of area of study under investigation. Questionnaire survey is adopted for this study because Kasimu *et al.* (2013) highlighted that the beliefs, perception, ideas, views and thought of professionals about area under study can be gotten very easily due to the flexible nature of questionnaire survey which can also be in a structured format and can cover large number of sample of individuals from a population.

Population and Sampling

Population size of 1962 was used in this study which constitutes numbers of registered construction firms with Abuja address, retrieved from cooperate affair commission (CAC, 2014). A random sampling method in form of Simple random sampling method is adopted. This was carried out by distributing questionnaires to construction firms, where all the firms have equal chance to assessed and professionals in those firms served as respondents that are willing and ready to accept the questionnaires. The respondents were asked to their level of agreement, how they strongly agree or disagree with the factors affecting the capture and re-use of project knowledge. Using a Likert scale of 1-5 as defined: Strongly agree, Agree, Neutral, Disagree and Strongly

disagree. This involves eliciting information on area of study from construction professionals in construction firms in Abuja focusing on knowledge workers in the construction industry such as Engineers, Quantity Surveyors, Estate Surveyors, Architects, and Builders in Nigeria. Therefore, construction firms in Abuja constitute the population of the study and sample of a research is described as a limited number of observations from a population. Usually, samples are drawn because it is impossible to cover all observations in a population (Ibrahim, 2011).

Determining sample size is crucial in a research work due to the fact that samples can be too large leading to waste of time, resources and money. Samples that are too small may lead to inaccurate results as well (Six sigma, 2007). Thus, sample size in this research was calculated based on Cochran (1977) formula for determining sample size.

$$n_0 = \frac{t^2 * S^2}{d^2}$$

$$n = \frac{n_0}{\left(1 + \frac{n_0}{\text{population}}\right)} \text{ (correction formula for final sample size)}$$

Where $t = 1.96$ obtained for alpha level of 0.05 (which is usually between 0.05 and 0.01 for most educational research).

Where $s =$ Estimate of standard deviation in the population (estimate of variance deviation for 5 point scale calculated by using 5 inclusive range of scale divided by 4 which represent standard deviation that includes approximately 98%).

The computation with the formula above yielded 139 where 50% of the sample size was added according to Sal kind cited in Bartlett, Kotrlik and Higgins (2001) to account for lost questionnaires or uncooperative respondents. Therefore, the study administered 209 questionnaires to the professionals in construction firms in Abuja, FCT. Construction Firms as categorized by Udechukwu cited in Abdulazeez (2012) is in three components namely: Micro enterprises, Small enterprises and Medium enterprises which have a corresponding employee's size of 0 to 9, 10 to 99 and 100 to 299 respectively. Odediran (2012) classified construction firms into small, medium and large in Nigeria. Therefore, construction professional in these firms that is the large, medium, small and micro served as source of primary data for this research.

In all, the study administered 209 questionnaires out of which 111 were returned and filled correctly with a response rate of 54.0%. According to Moser and Kalton cited in Abubakar, Ibrahim, Kado, and Bala (2014) a survey could be considered meaningful if the response rate is not below 30-40% obtained. The data obtained were analysed using descriptive analysis by determining their corresponding frequency, percentage, mean and standard deviation with the aid of SPSS 20.0 and was ranked accordingly. The standard deviation in this study is used to ranked items/statements that has same mean score accordingly. The one with the lowest standard deviation is ranked ahead of the one with the higher standard deviation value. The demography of the respondents is as presented in Table 1.

As shown in Table 1, 21.60% of responses gotten were from the Architect, followed by 34.20% responses from Builders, 13.50% were from the Quantity surveyors, the Engineers provided 26.10% responses and finally the least responses provided was from the Estate surveyors which made up 4.50% of the total responses obtained from the construction firms observed. The outcome

of these responses is similar to the findings of Oke *et al.* (2013) where respondents ranked builders first as professionals that share knowledge the most, followed by Quantity Surveyors which were ranked second and architect were ranked fourth. Engineers and estate surveyors were ranked the least at sixth and eighth respectively. The reason stated earlier could be the possible cause why the highest responses were gotten from builders at a percentage of 34.20 in this study.

Table 1: Demography of company and respondents

Characteristics	Frequency	Percentage
<i>Respondents Profession</i>		
Architect	24	21.60%
Builder	38	34.20%
Quantity Surveyor	15	13.50%
Engineers	29	26.10%
Estate Surveyor	5	4.50%
<i>Company response rate</i>		
Micro(0-9)	20	18.0%
Small(10-99)	65	58.6%
Medium(100-299)	8	7.2%
Large(over 300)	18	16.2%
<i>Professional's Qualification</i>		
Higher National Diploma	19	17.1%
Bachelor's Degree	54	48.6%
Masters	33	29.7%
Post Graduate Diploma	5	4.5%
<i>Professional years of experience</i>		
0 – 4	29	26.1%
5 -10	61	55.0%
11 – 15	9	8.1%
16 above	12	10.8%

The firms assessed in this study consist of Micro (0-9), Small (10-99), Medium (100-299) and Large (over 300) firms as shown in Table 1. Questionnaires were administered to these firms which yield response rates of 18.0%, 58.6%, 7.2% and 16.2% from Micro, Small, Medium and Large respectively. The Highest response rate of 58.6% was gotten from small size firms (10-99) which shows that they constitute a larger portion of responses in this study. In research carried out by Egbu *et al.* (2003) on small and medium size construction firms, it shows that these enterprises have challenges implementing KM initiatives. Therefore, responses gotten from these firms are considered to be relevant to this study.

RESULTS AND DISCUSSION

Assessment of Factors Affecting the Capture of Project Knowledge

Table 2 shows the means of the respondents’ perceptions on factors affecting the capture of project Knowledge with mean ranging between 3.30 and 3.90. Lack of standard platform to capture and share Knowledge (mean = 3.90), Organisational culture (mean = 3.84), Personnel changing companies or industry (mean = 3.55) were ranked first, second and third respectively as the factors affecting the capture of project knowledge. Employee retiring was ranked the least factor affecting the capture of project knowledge with mean of 3.30 while Viewing knowledge as competitive edge, Outsourcing and Employees transfer were ranked fourth (SD=0.883, mean =3.51), fifth (SD=0.923, mean = 3.50) and sixth (mean =3.39) respectively. The result of the study inferred that Standard platform to capture and share knowledge is the most agreed factor affecting the capture of project knowledge as viewed by the construction professional .The difficulty in capturing of knowledge was identified by Oke *et al.* (2013) as one of the problems of adopting knowledge management in Nigeria construction industry, while Sodiya *et al.* (2006) in a study on knowledge management discovered that best practices are not being captured and utilize effectively. This makes it necessary to give attention to the factors highlighted above.

Assessment of Factors Affecting the Re-Use of Project Knowledge

Table 2 shows the means of the respondents’ perceptions on factors affecting the reuse of project Knowledge with mean ranging between 2.97 and 3.86. As observed in Table 2, Teams being separated after completion of project (mean = 3.86), Motivation (mean = 3.77), Organisational Culture (mean = 3.75) are ranked first, second and third respectively as the factors affecting the Reuse of project knowledge. Employee retiring was ranked the least factor affecting the Reuse of project knowledge with mean of 2.97 showing that it’s fairly significant. Personnel’s changing companies or industry, self-confidence and Death were ranked fourth (mean=3.65), fifth (mean=3.26), sixth (mean=3.21) respectively.

Table 2: Assessment of factors affecting the capture of project knowledge

S/N	Factors Affecting the Capture of Project Knowledge	Level of agreement					Mean	SD	Rank
		1	2	3	4	5			
1	Personnel changing companies or industry	9	8	27	47	20	3.55	1.118	3 rd
2	Standard platform to capture and share Knowledge	6	2	24	44	35	3.90	1.044	1 st
3	Employee retiring	6	22	29	41	13	3.30	1.084	7 th
4	Employees transfer	5	12	38	47	9	3.39	0.946	6 th
5	Viewing knowledge as competitive edge	0	15	38	44	14	3.51	0.883	4 th
6	Outsourcing	2	13	37	45	14	3.50	0.923	5 th
7	Organisational culture	0	10	21	57	23	3.84	0.859	2 nd

Strongly Disagree, 2- Disagree, 3- Neutral, 4-Agree and 5- Strongly Agree

However, the mean of the above percentage of responses gave the ranking in Table 3, with Team separation after completion of project as viewed to be the most militating factor conforms with Sodiya *et al.*(2006) view on a research carried out on knowledge management that tacit knowledge are lost when employee leaves.

Table 3: Assessment of factors affecting the reuse project knowledge

S/N	Factors Affecting the Reuse of Project Knowledge	Level of agreement					Mean	SD	Rank
		1	2	3	4	5			
1	Personnel changing companies or industry	4	10	30	44	23	3.65	1.024	4 th
2	Team being separated after completion of project	3	9	14	60	25	3.86	0.952	1 st
3	Motivation	6	4	23	54	24	3.77	1.006	2 nd
4	Organisational Culture	0	10	28	53	20	3.75	0.858	3 rd
5	Self confidence	11	13	31	48	8	3.26	1.085	5 th
6	Employee retiring	8	21	50	30	2	2.97	0.909	7 th
7	Death	10	24	23	41	13	3.21	1.176	6 th

Strongly Disagree, 2- Disagree, 3- Neutral, 4-Agree and 5- Strongly Agree

CONCLUSION

Several factors affecting the capture of project knowledge were identified, including personnel changing companies or industries and the need for a standard platform to capture and share knowledge. Additionally, employee retirement was also found to be a relevant factor. Among these factors, the standard platform to capture and share knowledge received the highest ranking with a mean score of 3.90. Similarly, various factors influencing the reuse of project knowledge were identified, such as personnel changing companies or industries, team separation after project completion, and a lack of motivation. However, the factor of team separation after project completion (mean = 3.86) was ranked as the most significant by construction professionals.

Based on the findings, it is recommended that future studies place particular emphasis on the relevance and effectiveness of standard platforms for capturing and sharing knowledge. This focus is crucial in order to prevent the loss of valuable project knowledge. Furthermore, proper management of team separation after project completion is also essential to ensure the retention and effective utilization of project knowledge.

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