PROFESSIONALS' PERCEPTIONS ON THE IMPORTANCE OF KNOWLEDGE MANAGEMENT PRACTICES AND ITS EFFECT ON CONSTRUCTION PROJECT PERFORMANCE IN NIGERIA

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Abstract

The systematic management of vital knowledge is seen to enhance the efficiency and effectiveness of organisations such as construction firms through the practice of knowledge management. However there have been several set back in the use of Knowledge management in addressing problem associated with project performance and managing of project knowledge in Nigeria. The study aimed at assessing the professionals' perceptions on the importance of knowledge management practices and its effect on construction project performance. The research implored quantitative method of data collection in which structured questionnaire was used. The study population constitute 1962 construction firms and out of which a sample population of 209 construction firms were identified for this study. Data for the analyses were collected using multi-stage random sampling method and analysed using descriptive statistics with the aid of SPSS version 20.0. The study reveals that team encouragement to share knowledge was the most important Knowledge management practice attribute identified (RII=0.87). "Standard platform to capture and share knowledge" (RII=0.78), and "Team separation after completion of project" (RII=0.77) were ranked first as the factors affecting the capture and reuse of project knowledge respectively.Findings on perceived effect of Knowledge management practice on project shows that, "senior management support/commitment in knowledge creation and use" (M=3.96)was perceived to have anoverall effect on performance. Furthermore, the level of association of knowledge management practice on time, cost and quality reveals that, "project time" is significantly associated with "stimulating innovation and knowledge creation" (Sig level = 0.001). "Project quality" is significantly associated with"building the right know-how and expertise" (Sig level = 0.001).Lastly "using accessible knowledge in decision making" (Sig level = 0.005) is significantly associated with"project cost".

The study concludes based on the professional's perception that team work is vital in knowledge management practices. Therefore, the study recommends encouragement of project team to share knowledge, develop standard platform to capture knowledge, management of team separation after project completion,in order to improve project performance in the construction industry.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

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. In order for a construction industry to prosper in a knowledge economy it needs to take care of its skills deficiency in terms of creativity and maintaining of knowledge culture (Anumba*et al*., 2005).The construction industry is divided into two segments, the formal segment and informal segment. The nature of the industry in the formal segment consists of specialized skilled professionals such as the Architects, Builders, Quantity Surveyors, Estate Surveyors and Engineers. These professionals join hands together to enhance activities of the construction industry. The informal segment on the other hand is made up of skilled craft persons. Both segment come together in order to enhance the industry, for this purpose, knowledge is developed,transferred and managed within the industry with the construction professionals responsible for these processes (Oke*et al*., 2013).

Currently, construction industry seeks quicker outcome from construction processes, and practitioner's needs to decide quickly on alternative solution to problem by integration of ideas from construction professionals (Anumba*et al*., 2005). According to Boondao (2013) Knowledge management has played a crucial part in improving the way companies carry out their task especially in terms of desired or intended result. Knowledge management is a way of making available the right knowledge to the people that need it at that particular time (Oke*et al*, 2013). Organisational performance can be enhanced through Knowledge management by increasing quality of work done to achieve a better performance

(Jasimuddin, 2012).According to Meng (2011) performance of a project is determined in terms of time, cost and quality.Projectthat is finished at a desired period, with a required quality and does not exceed cost provided for its execution is generally described as a successful project. In order to determine firms performance Marque's and Garrigo'simon (2006) carried out a researchon 222 Spanish firms in the biotechnology and telecommunications industries in order to determine practices that have a positive incidence on firm performance. It was observed that firms that adopt knowledge management practices obtain better results than their competitors.

However, Knowledge management remains a subject of misunderstanding among professionals and used wrongly by management consultants (Sheehan *et al*., 2005). Reasons could be given that knowledge management has been around for longer than the actual term has been in use. Knowledge management practice is seen to be supported through town meetings, workshops and seminars. The most important tools and method used to transfer knowledge consist of the people themselves. At the moment, knowledge management has shown beyond doubt to worth more than the long-time physical or tangible asset most valued by organisations (Dalkir, 2005).

According to Rabiu (2009) Knowledge management is seen as being in the scope of human resource management (HRM) practice, though it is gradually appearing as a clearly different practice in managing organisation functionality which relates to learning ,training, organisation design and organisation effectiveness. Dalkir (2005) said that critics show slight argument that knowledge management is not and cannot be said to be a distinct practice with a unique subject. This argument is represented with the expression that "KM'' (knowledge management) is just ''IM'' (Information Management)" or "KM" is just a good

business practices. According to Association for Information and Image Management (AIIM, 2015) Information management (IM) is described as the gathering and management of information from one or more providers and the distribution of that information to one or more people. Sometimes it involves people who have an interest in, or a right to that information. According to Dalkir (2005) a good description of knowledge management includes both the capturing and storing of the knowledge perspective, together with the valuing of intellectual assets. Hence, Botha (2004) describe knowledge management as a process of systematic management of vital knowledge and its associated process of creating, gathering, organising, diffusion, use and exploitation.Dalkir (2005) stated that one of the major attributes of Knowledge management relates to the fact that it deals with knowledge as well as information. Another feature of knowledge management over information management is the ability of knowledge management to address knowledge in all types, especially, tacit knowledge and explicit knowledge.

Organisation in the knowledge age was described byDalkir (2005) as the one that learns, remembers, and performs based on the best available information, knowledge, and know-how. The rise of the knowledge era as a necessary part of the global economy has resulted to a dramatic change in the way businesses are been done. According to Egbu (2005) in a knowledge economy, it could be seen that different kinds of knowledge are obvious. Knowledge such as know-what, know-why, know-how and know-who are evidence. Construction industry faces some difficulty in adopting the beliefs of the knowledge economy. This could be according to Anumba*et al*.(2005) as a result of construction industry and firms having to deal with increase in competition, the construction market becoming more global, the manner in which demands are been made by clients, customers

and the society. In order to have a more achieving industry,it becomes important that the industry has an efficient, motivated and competent workforce.

1.2 Statement of Research Problem

According to Egbu*et al.* (2005) the type of construction markets prevailing has resulted to greater demands from clients andan increase in the level of involvement of the clients. The complicated nature of projects, the increasing collaborative nature between client and contract administrators has made the construction industry increasingly becoming a more knowledge-intensive industry. Professional knowledge is being relied upon in a knowledge-intensive industry. Most construction firms are said to have undertaken Knowledge management practice in one way or the other which have yielded some positive result in terms of organisations' effectiveness and efficiency(Anumba*et al*., 2005;Boondao, 2013). However these practices are not clearly label with knowledge management but are just seen as a good business practice rather than KM practice (Ferguson *et al*., 2008; Quintas, 2005). Due to this Knowledge is lost during the development stages of project as a result of lack of KM practices by construction professionals. Knowledge that supposed to have been built on earlier knowledge developed, to get rid of costly redundancies and avoid making at least the same mistake have not been fully leveragedleaving construction company to reinvent in the wheel(Kasimu*et al*., 2013; Dalkir, 2005).

Anumba*et al*. (2005) also statedthat, the links between KM and business performance is not clearly understood. Project performance has increasingly been a source of worry, as the construction industry is struggling to meet up with the client demands in terms of time, cost and quality (Meng, 2011). KM practice in relation to performance in the construction industry is not clear (Anumba*et al*., 2005).

Meng (2011) stated that, time, cost and quality has been generally identified as the three most important target of project success.However, when construction projects are lacking significant achievement, these are shown in terms of time delays, cost overruns and quality defects. Kasimu and Usman (2013) highlighted that delay in construction projects in Nigeria was as a result of incompetence of contractors, poor experience of project team and mistakes during construction. Similarly, poor knowledge of work as a result of not managing an organisation knowledge base and important tacit knowledge causes low performance (Ailabouni*et al*., 2009). Furthermore, knowledge created during the construction phase of projects wasstill lostas a result of lack of awareness of the benefits resulting from knowledge management practice (Kasimu*et al.,* 2014).This set back in KM was acknowledged by Oke*et al*. (2013) stating that, there are limitations to managing of information and knowledge relating to construction project in Nigerian construction industry.

1.3 Justification of the Study

According to Armstrong (2006), in order for construction industry 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. 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 machine. 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).

Knowledge is identified as one of the most important assets of any organisation (Egbu*et al*., 2005). Knowledge management when fully adopted in the construction industry can result to enhancement in productivity; better customer satisfaction and enhancing the way organisations act to client needs. Some potential benefits can also be in form of preventing repetition of same error, bridging the gap between what organisations know and what individual know in an organisation.Improve professionalism and also better supports for knowledge workers can be derived from KM to enhance construction project performance in Nigeria (Oke*et al.*, 2013).

Certainly the relative importance of the construction sector to the Nigerian economy cannot be underemphasized as it contributes tremendously to the gross domestic product of the nation. Assessing knowledge management in the Nigerian construction industry seems to present a rewarding area for research due to various benefits highlighted to be derived through the adoption of Knowledge management.

1.4 Aim and Objectives

1.4.1 Aim

The aim of this research is to assess professionals' perception on knowledge management practice on construction project performance with a view to enhancing building project delivery.

1.4.2 Objectives

The specific objectives are;

1. To assessthe importance of knowledge management practice attributes in the construction industry.

2. To assess the factors determining the capture and reuse of project knowledge.
3. To examine the perceived effect of knowledge management practices on project performance.

1.5Scope and Limitations

1.5.1 Scope

This research focused on knowledge workers as described by Egbu*et al*. (2005) as being responsible for providing important skills and knowledge in the construction industry. They include Engineers, Quantity Surveyors, Estate Surveyors, Architects, and Builders as highlighted in a research carried by Oke*et al*. (2013) on Knowledge management practice among construction professionals in Nigeria. Furthermore, this study was carried out in Abuja because it's one of the fastest developing capital cities in the world according to Real Estate Development Agency of Nigeria (REDAN, 2012). Due to the large expanse of the construction industry, the study is limited to the views of construction professionals such as the Architect, Builders, Engineers, Quantity Surveyors and Estate Surveyors who are engaged in construction activities in the FCT Abuja. Lastly, the knowledge type considered in this research is in form of tacit knowledge in a way of assessing professionals knowledge and also in the form of explicit knowledge that is, trying to examine establish practices or laid down procedure of carrying out knowledge management in respondents' organisation.

1.5.2 Limitations

1. The research encountered rejections from certain companies that were not willing to participate in responding to the questionnaire.

2. Certain professionals in some firms did not find it suitable divulging personal information which resulted in their replacement.
3. The research work encountered certain limitations as a result of insufficient knowledge of the subject by the representatives of the company.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

2.1.1 Concept of knowledge management in organisations

The introduction of the concept of knowledge into management practice makes the single characteristics of knowledge to be realised, which ledorganisations to view different ways to question assumptions that might otherwise be taken for granted by treating knowledge as an unproblematic commodity which can be presented and assimilated without great effort tending organisations to miss the concept behind the management of knowledge (Anumba*et al.*, 2005).

Using Knowledge according to Dalkir (2005) does not consume it, also transferring of knowledge does not result in losing it, knowledge is abundant, but the ability to use it is scarce and of course much of an organisation's valuable knowledge walks out the door at the end of the day. Kasvi*et al.* (2003) highlighted that, identification of critical knowledge and the ability to utilize it is a challenge for any project organisation. Bhojaraju (2005) stated that, an organisation's Knowledge must be a living organism that gets improved on a continuous basis as previous gaps are filled with new Knowledge, new subject matter experts are been identified or new knowledge capabilities are defined. These make all contents to be planned in such a way that it will make it easy for collaboration among teams working in various projects.

The aspect of Knowledge management according to Botha cited in Frost (2010) that, make KM possible are primarily the infrastructure which sustains the systems, teams, structures, and collaboration. Secondly the measures in developing a process and design for managing

change. Lastly is the technology aspect which offers great advantage and constitutes part of enablers of knowledge management. Knowledge management in an organisation like construction industry involves project knowledge created through the actions of individuals, project teams and construction organisations and the interaction of different types of knowledge (Anumba*et al*., 2005). There are two major types of knowledge according to Dalkir (2005) which are the Tacit and Explicit Knowledge.

2.1.1.1Tacit knowledge

Tacit knowledge is that knowledge stored in the brain of person/professionals(Uriate, 2008). Dalkir (2005) describes tacit knowledge as difficult to communicate and also difficult to put into words, text, or drawings. Management of tacit knowledge according to Dave and Koskela (2010) is of utmost importance to construction industry due to the temporary nature of the industry. Additionally,it's also due to the fact that each construction project is unique in its form and creates a meaningful amount of knowledge during its execution. Anumba*et al.* (2005) highlighted that, construction problems are solved as a result of long tradition of apprenticeship schemes in the construction industry responsible for developing different craftsmen who depend on their tacit knowledge through shared experience by continuous interaction and learning from each other. Similarly, young engineers, architects and surveyors increase their academic training through mentoring that develops their knowledge in the organisation. This additional experience enhances the daily functioning of organisations and contributes to the attainment of their objectives (Uriarte, 2008).

2.1.1.2Explicit knowledge

Explicit knowledge is that knowledge contained in documents or other forms of storage material or device other than the human brain (Uriarte, 2008). Explicit knowledge are

simply communicated, stored and easily transmitted to others as described by Sveiby (1997) cited in Boondao (2013). Explicit knowledge according to Anumba*et al*. (2005) is reusable in a consistent manner and therefore easier to share. In construction the explicit knowledge could be in form of design codes of practice, performance specifications, site drawings or electronic format drawings and construction techniques used. It could also include materials testing procedures, design sketches and textbooks. This type of knowledge can likewise boost the day-to-day running of organisations and contributes to the attainment of organisation objectives(Uriarte, 2008).

2.1.2 Definitions of Knowledge management

Knowledge management has no universally accepted definition but there are numerous definitions proffered by experts. Knowledge management can be simply the conversion of tacit knowledge into explicit knowledge and the sharing of it within the organisation. It can also be concerned with the process of identifying, obtaining, sharing and preserving knowledge that is essential to the organisation (Uriarte, 2008). Knowledge-Management-Online (2009) highlighted that, there are several different and sometimes quite confusing statements that sometimes may be a definition of Knowledge Management as stated.

1. KM is about set of principle and application tools.
2. KM is about individuals in an organisation and organisations ways of acquiring knowledge.
3. KM is about series of actions, way of practice and the procedure.
4. KM is about managing knowledge assets.
5. KM is about analysing the whole system and using it to have a competitive edge.

6. KM is not a distinct practice and due to this all knowledge workers should try to incorporate it in their daily activities.

However, Dahiya*et al*. (2012) described KM as a management strategy directed at developing, transferring, transmitting, storing, and providing knowledge to improve competency and efficiency of organisational employees. Encarta (2009) defines Knowledge management as the organisation of intellectual resources and information systems within a business environment such as the construction industry.Chang and Lee (2008) defined it as useful processes that have effect on the performance of an organisation in distinct ways.

Most definition of Knowledge management is seen to entail the capturing, storing of knowledge and the process involved. Therefore, this study adopted the definition of KM by Botha *et al*. (2004) which describe KM as a process of systematic management of vital knowledge and its associated process of creating, gathering, organizing, diffusion, use and exploitation. Dalkir (2005) highlighted that the definition of KM has no general form considered to be satisfactory. It was explained further that some definition addresses both tacit and explicit knowledge with the goal of adding value to the organisation and stated that organisations should define KM in terms of the objectivesof its business concept.

2.1.3 Benefits of Knowledge management

Several researchers have highlighted some benefits that can be derived in the adoption of KM practices in the construction industry. Anumba*et al.* (2005) highlighted the followings as the potential benefit of KM in the construction industry.

1. It develops an innovative environment for managing knowledge.
2. Enhance performance ofworkers.
3. Enhance construction project delivery.
4. Simplify process of knowledge transfer across varied project type.
5. Prevents repeating of same error.
6. The disparity between what organisations knows and what individual working in an organisation knows is being narrowed down.
7. It enhanced the way organisations act to client needs.
8. Better supports for knowledge workers can be derived from KMto enhance organisation performance.
9. Spreading of best practice.
10. Improves methods of storing knowledge.
11. Better management of knowledge in construction firms can improve general satisfaction of client.
12. Construction organisations can respond to organisational changes better and faster.
13. Reduction of risk is one of the important benefits of KM.

In Malaysia, Kasimu*et al*. (2013) highlighted benefit of KM practices in a research carried out on Nigerian civil engineering firms as follows:

1. Reduction in effort of amending mistakes during construction.
2. Improves organisation ability to solve problem and makedecision.

3. It enhances organisation competitive positions.
4. It improves economic profitability of organisation.
5. Improvement in organisations ability to manage changes and client demand.
6. Improvement in problems solving capability.
7. Improvement in project delivery process in term of cost.
8. Improve experience of sharing problems.
9. Improvement in project delivery process in term of quality.
10. Enhancement in personal capability
11. Improvement in bidding performance
12. Reduce unnecessary costs.
13. Improvement in project delivery process in term of time.
14. Improvement in work efficiency.

At the end it was observed in the research that reduction in construction rework was ranked top in the study as the benefit derived from KM by respondents in the industry and Improvement in work efficiency was ranked least benefit of KM practice in the civil engineering Construction firms. Also Oke*et al*. (2013) carried out a research on KM practices among construction professionals in Nigeria. The following items/statements are highlighted as the benefit of KM practice to be derived:

1. Improvement in job analysis and specification.
2. Improvement in communication skills.
3. Training benefits of new employee.
4. Improvement in productivity.
5. Increased customer satisfaction.

6. Enhance professionalism.
7. Increase employee's morale creativity and ingenuity.
8. Maintain competitiveness.
9. Improvement in leadership control.
10. Raise company professional Image.
11. Increase innovation.
12. Rapid and effective in enterprise wide problem solving.
13. Market research.

It was observedin this research that, improved job analysis and specification was ranked first and market research was ranked the least benefit derived from the adoption of KM. In conclusion, this makes it obvious with the statement of Anumba*et al*. (2005) that the application of KM practice can lead to various advantages to organisations in different ways such as keeping ofcompetitive edge and also in the long run survival of an organisation.

2.1.4 Elements of Knowledge Management

Knowledge management system is made up of four elementsaccording to Dalkir (2005) which include the following:

1. Knowledge creation and capture,
2. Knowledge sharing and enrichment,
3. Information storage and retrieval,
4. Knowledge dissemination.

2.1.4.1 Knowledge creation and capture

Knowledge creation and capture is the first element of knowledge management. Group creates Knowledge during continuous interaction and one of the primary aims of knowledge

management is to capture knowledge during such interactions. The very survival of a corporation sometimes depends largely on how much new and advanced knowledge can be generated, captured and utilized. For this reason, two factors have become of greatest significance in influencing competitiveness,which are creativity and innovation. These two factors have turn out to be not only vital, but necessary, to the lasting sustainability of anorganisation (Dalkir, 2005).

Knowledge capture is important according to Hari*et al*. (2004) as key decisions are made based on experience and information which is usually shared informally which makes the capture of an employee's knowledge crucial for the organisation. According toEgbu*et al*. (2003) organisation's ability to maintain knowledge in the face of complexity, uncertainty and rapid change will improve chances oftheir long term survival.

2.1.4.2 Knowledge sharing and enrichment

The second element of knowledge management is knowledge sharing and enrichment. This element is also a need of Knowledge management. It is during the process of sharing that knowledge is usually refined and enriched. Through memos and instructions Knowledge can be shared within the organisation. Knowledge sharing can be improved through the application of proper mechanism to facilitate its processes. Knowledge sharing doescome in place naturally but have to be encouraged and nurtured for its competitive advantage. Communities of practice have been proven to be a brilliant way to share knowledge in the midst of people who have a common interest (Dalkir, 2005).

2.1.4.3 Information storage and retrieval

Information storage and retrieval is the third element of knowledge management which entails making acquired knowledge readily accessible. There are four main options for

storing information that are captured or shared. They entails, file system storage, databases, e-mail and websites (Dalkir, 2005).

2.1.4.4 Knowledge dissemination

Knowledge can only be effective when properly disseminated. It involves transformation of individual tacit knowledge into explicit knowledge .Such results can best be measured in the long term. Knowledge centres are also effective means to disseminate knowledge. Publications, presentations, websites and libraries are the most obvious forms of dissemination of knowledge (Dalkir, 2005). Knowledge dissemination consists of knowledge transfer and knowledge sharing. Trust is considered to be vital for knowledge dissemination, as identified by respondents in a study. Face to face discussions isalso an important way of knowledge dissemination (Egbu*et al*., 2003).

2.2 Effect of Knowledge Management Practices on Construction Industry

According to Lara (2008) the way construction organisation carry out their services has a direct connection to knowledge management, such as management measurement systems and knowledge flows such as training. In the same study by Lara (2008) on the effect of knowledge management on organisations in analysing directive competencies it was found out that KM is the most important source of competency creation within an organisation. Furthermore, two different features can be observed in the research, the first emphasize learning as the principal factor in KM programs for achieving positive results in acquiring professional competencies. The other feature attributes competency creation within an organisation in relation to the possession of knowledge assets.

In Sydney, Michael (2006) carried out a researchon effects of knowledge management on information sharing practices. It was observed in the research that the value of knowledge

management to large multinational corporations is undisputed. Knowledge management also aids personnel build a collaborative culture, create and extend their own personal business networks. Downsizing was found to have a close effecton the value of KM in the short-term, especially as employee morale is normally low throughout these times of considerable change. In other to have a functional KM it becomes necessaryfor sharing and creation of knowledge together before the threat of redundancies loomed and subsequently affected social practice.

In spain, Marque´s and Garrigo´simo´n (2006) highlight the relevance of the human dimension necessity for developing an effective KM strategy, in a research carried out on effect of knowledge management practices on firm performance. It was pointed out that, the effectiveness of KM can be evaluated through staff involvement and motivation in projects. Impact of KM should be accepted with good reason due to changes in people's behaviour as KM spreads. Consequently assessing performance is a display of success and pointed out that successful KM practice is not only as a result of managers' supports, but should also raise the awareness and support of staff. The greater the staff involvement, the greater the possibility for knowledge transfer. Secondly, the ability to bring together learning from a previous project is important (Koenig (2002); Cong and Pandya (2003); Fong (2005)).

The construction industryaccording to Egbu (2005), like many otherindustries that engage in project,has its own special attributes which has effect on KM. Characteristics such as projects start time and finish dates, temporary nature of project,as well as different professionals and workers are most present. This makes the coming together of different professionals and workers last forcomparativelyshort period of time during a construction project activities.

2.3 Component of Knowledge Management

Three aspects of knowledge according to Anumba*et al*. (2005) is to be managed in a construction environment such as products or project types, processes and people.The knowledge base of construction organisations is a function of the procedures put in place to capture knowledge about processes, products and people. Bhojaraju (2005)categorised KM components based on leading global KM case studies into three classes' people, process and technology. An organisation implementing KM has found it relatively easier to put technology and processes in place but the people component has posed greater challenges.

Furthermore, Davenport (2000) stated that knowledge mainly lives in people not technology and technology support can be seen as a link that allow people to communicate with other devices, though it is important to put technology in place as it is an enabler to support the Knowledge management process. Additionally, Sheehan *et al*. (2005) highlighted that in other to establish KM plan, it becomes imperative to examine the impact of existing KM attempt on organisation as most construction firm has one of these components in place.

2.3.1 People component of KM

Anumba*et al*. (2005) stated that people-based factors relate to skills, problem-solving abilities and the characteristics of teams. Highly skilled individuals and competent teams are vital for construction process. The management of people and the relationship amongst individuals, groups and organisational knowledge are vital concentrations for KM. People were recognised to possessing knowledge and know-how, having the ability to create knowledge and value, and collectively retaining organisational memory. This makes standard construction requires individuals with basic knowledge and skills. Individuals with

tacit knowledge are vital to the resourcefulness required in the design and construction of innovative projects.

2.3.2 Process component of KM

The Process component of KM include standard processes for knowledge-contribution, content management ,recovery, involvement on communities of practice, implementation-projects based on knowledge-reuse, methodology and standard formats to document best-practices. It is however, important for KM processes to be clear, simple as possible and well understood by employees across the organisation (Bhojaraju, 2005). Process-based factors relate to the technical and management systems required for the delivery of products. The technical and management processes are used in the delivery of project construction 'end products' required by clients. Technical processes range from highly knowledge intensive approaches relying mainly on tacit knowledge, such as producing design sketches using pencil and paper, to automated processes relying on intelligent and explicit knowledge codified in plant, machinery or robots for on-site construction (Anumba*et al*.,2005).

2.3.3 Technology component of KM

KM technology solutions provide ways to support knowledge-sharing, collaboration, workflow, document-management across the enterprise and beyond into the extended enterprise. These tools typically offers a safe essential space where personnel, clients, partners and suppliers, can exchange information, share knowledge and guide each other to better organisational decisions. The most popular form of KM technology enablement is the Knowledge-Portal on the Corporate Intranet and extranets where customers, partners and/or suppliers are involved. Technology is viewed to be a key enabler to KM, it is then important

to ensure that the technology solution is user-friendly and simple to use (Anumba*et al*., 2005).

2.4 Project Knowledge

Stanescu and Filip(2009) stated that, 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 koskela (2010)highlighted that construction industry is characterized by construction projects that are fragmented and ad-hoc in nature. This makesthe capture and reuse of valuable knowledge difficult during a construction project.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 also mainly refers to the need to capture knowledge.

Project knowledge according to Anumba*et al.* (2005)is described as knowledge including data /information that is required to conceive, develop, realize and terminate a project. Kamara*et al*. (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 KM across the lifecycle of a project.Inthe construction industry re-use of project knowledge is identified as one of the challenges faced asKnowledge is not often available for general reuse (Anumba*et al*.,

2005). Knowledge produced during socialization and interactions according to Dalkir (2005) are not adequately captured. This knowledge is implicit in nature and constituent what makes project knowledge

2.4.1 Knowledge reuse

Reusing knowledgeinvolves 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 (Dalkir, 2005).

2.4.2 Knowledge capture

It was highlighted byDalkir (2005) that 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 raised concern which 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*et al*.(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 its usage. As observed in same study 67% of the responses acquired indicate knowledge capture as the most challenging element of knowledge management.

2.4.2.1Knowledge 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 are to bank the knowledge and disseminate the knowledge. These stages are presented in figure 2.1.

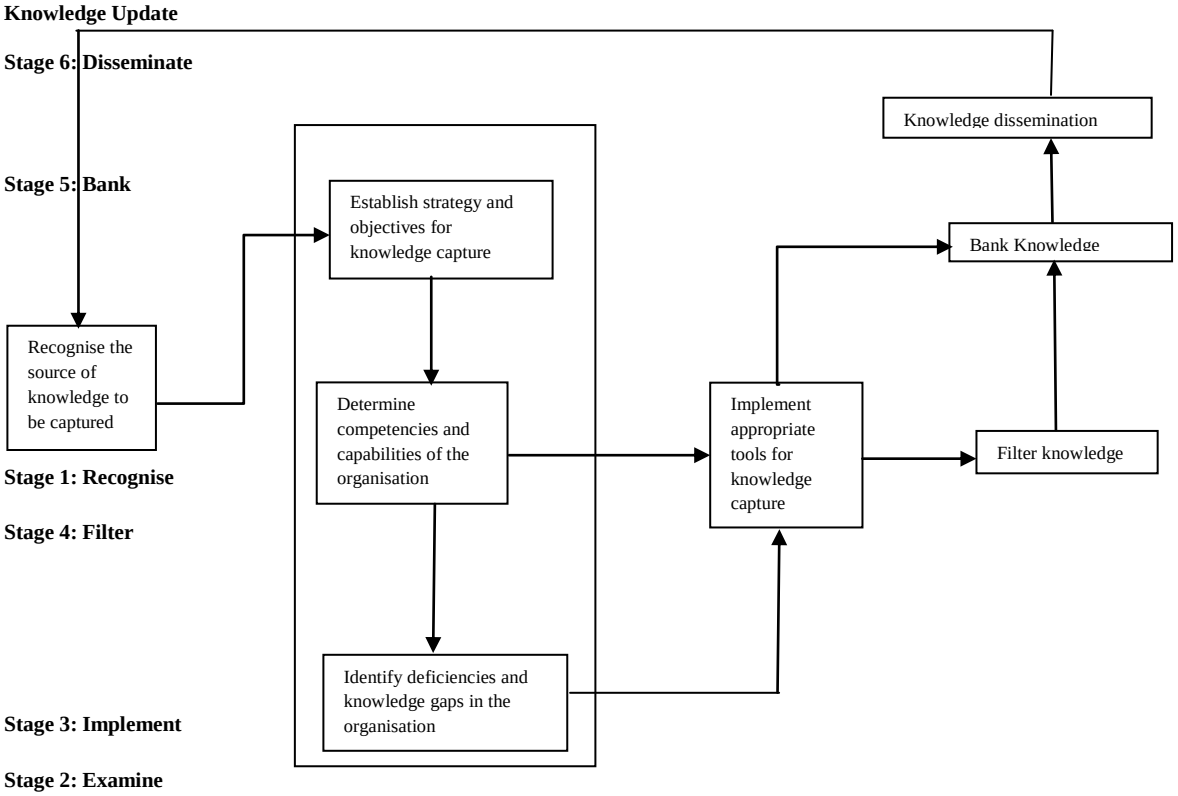


Figure 2.1: knowledge capture process

Source: Hari*et al*. (2004)

2.4.3 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, Egbu*et al*. (2003),Sodiya*et al*. (2006),Anumba*et al*. (2005),Dalkir (2005),Rabiu (2009),Tan *et al*. (2010) and Frost (2010) have highlighted some 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:

1. Employees leaving.
2. Employee been transferred.
3. Retiring and at the end best practices and lessons learned are not being captured and utilized effectively.

According toAnumba*et al*. (2005)Tacit knowledge in an organisation can be lost when KM practice is not given priority through the following means:

1. Employees leaving
2. Retirement
3. Death of employee

In addition Dalkir (2005) stated that, organisations find it difficult to manage knowledge. However it is essential to identify that knowledgethat is of value and is also at risk of being lost to the organisation. It is then highlighted that such knowledge can be lost through the following means:

1. Retirement
2. Turnover
3. Personnel changing companies or industry
4. Teams being separated after completion of a project
5. Lack of a standard platform to capture and share knowledge
6. 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 also 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 be lost through poor organisational structure and lack of motivation to share knowledge.

2.5Knowledge Management in the Construction Industry

Knowledge management has long been in existence which has been used in different forms by people such as knowledge acquired from a large scale social interaction and through working together for knowledge transfer. In the surrounding conditions of an organisation, knowledge management has existed in one form or another. This is seen inform of training hand book, established methods of carrying out task and programme of action documents and discussion on innovative way of doing things. Knowledge-based perspective is one of the key issues as to how knowledge of individual organisational members can be

incorporated into products, services, processes and routines that benefit the organisation (Poyhonen, 2005).

Carrillo *et al*. (2004) highlighted that construction firms needs to find out reasons for KM practices in the construction organisation as this is important to stimulate uninterrupted advancement, in order to share important tacit knowledge, to spread best practices, to respond to clients quickly, to reduce mistakes during project execution, and to develop new products and services.

According Oke*et al.* (2013) knowledge management is becoming increasingly important due to rapid changes in markets conditions, competition and technological improvements which cause changes in work and the way work is organized. HoweverKasimu*et al*. (2013) stated that construction firms in Nigeria have belittled these emerging trends because of lack of innovation, development in the construction process and likewise development in organisational efficiency and effectiveness.

2.5.1 Knowledge management practice

KM practice is a vital resource to the construction organisation (Kasimu*et al.,* 2013). Practice is the way in which an organisation usually carries out its activities to an established custom for it potential benefit. According to Encarta (2009) best practice is the most effective or efficient method of achieving an objective or the best way to do something. Dalkir (2005) described knowledge management practice to represent a deliberate and systematic approach to ensure that organisation's get a complete exploitation of their knowledge-based regarding the potential of individual expertise, capabilities, judgments, innovations, and concepts to create a more efficient and effective organisation.

In an organisation, KM practices can involve determining the organisation's knowledge and know-how. These entails firstly knowledge discovery and detection which refers to the processes of identifying existing knowledge sources as well as realising unknown knowledge in data / information talking about the explicit / tacit knowledge. organisations practice of knowledge management can also involve Knowledge organising and assessment. This involves the process of recording, groupingand evaluating of organisational knowledge assets (Frost, 2015).

2.5.2 Reviews on knowledge management practices

KM practices is described according to O'Dell cited in Dalkir (2005) as one of the needs of Knowledge management.Marque's and Garrigo'simon (2006) categorizes KM practices into six dimensions which makes it easier for managers to concentrate on, in order to determine the specific actions to carry out to introduce them. Frost (2015) explains that,KM practices process, spreads throughout the organisation and its scope is difficult to define. However if properly implemented it can result in enhancing an organisation competitive advantage and promote efficiency. Based on literature on KM, several researchers have identified various practices of knowledge management. A brief summary is presented in Table 2.1, Table 2.2, Table 2.3 Table 2.4 and Table 2.5.

Table 2.1: Dimensions of KM practices

S/N	KM practice
A.	Orientation towards the development, transfer and protection of knowledge 1. System to codify its explicit knowledge 2. Information technologies and systemsavailable to give the access to the information required for work. 3.Mechanisms put in place to inspire the personnel of an organisation to share information. 4. Inter-departmental projects are carried out in the firm.
B.	Continuous learning in the organisation 1. The firm has a career plan to stimulate continuous learning. 2. Employees receive common training which is functional to their usual tasks. 3. A continuous improvement system is in place allowing for development in procedures which have become the set quality standards.
C.	An understanding of the organisation as a global system 1. A system exists to inform clients, suppliers, employees, according to the needs detected. 2. The organisation encourages knowledge transfer over instruments such as inter-functional teams, quality circles, improvement groups. 3. Best practices in one department are shared by others. 4. There are incentives when the overall aims of the firm are achieved. 5. The firm has systems that capture and deal with information about processes.
D	Development of an innovative culture that encourage projects. 1. Employees who develop projects have the necessary training to put them into practice. 2. Techniques are established to develop external benchmarking, which enables the company to learn about the success or failure of other firms. 3. Projects are provided with control mechanisms to monitor them. 4. When a project finishes, feedback is obtained that is useful in developing new projects.
E	Approach based on individuals 1. Tasks are established to identify the information resources necessary for the organisation. 2. The firm encourages teamwork. 3. Procedures are established (such as surveys or discussions) to find out employees' opinions and levels of satisfaction. 4. The managers inform of and reward their collaborators' achievements.
F	Competence development and management based on competences 1. The organisation has systems to measure its employees' competences. 2. Remuneration and promotion systems have an influence on the development of competences, ideas and knowledge by the employees. 3. The firm uses benchmarking techniques to improve its employees' competences.

Source: Marque's and Garrigo'simon (2006)

Table 2.2: Key features of KM practices

S/N	KM practice attributes
1.	Generating new knowledge.
2.	Accessing valuable knowledge from outside sources.
3.	Utilising accessible knowledge inmaking decision.
4.	Implanting knowledge in processes, products, and/or services.
5.	Representing knowledge in official papers, databases, and software.
6.	Assisting knowledge growth through culture and incentives.
7.	Transferring existing knowledge into other parts of the organisation.
8.	Transfer of knowledge and best practices.
9.	Personal responsibility for knowledge.
10.	Innovation and knowledge creation.

Source: Ruggles and Holtshouse (1999) found in Dalkir (2005)

Table 2.3: KM practices

S/N	KM practice
A	Creativity and innovation
B	developing (career management) and rewarding (compensation) the knowledge workers
C	Training to make knowledge available.
D	Knowledge creation
E	Knowledge dissemination
F	Knowledge sharing
G	Development of an atmosphere conducive to maintaining motivation and the desire to share knowledge

Source: Uriarte (2008)

Table 2.4: Practices of Knowledge management

S/N	KM practice
1.	Balance of flexibility and ease of accessibility to knowledge
2.	knowledge sharing
3.	knowledge-friendly culture
4.	Motivating workers to develop, share, and use knowledge
5.	knowledge transfer using various information technology infrastructure
6.	senior management support and commitment
7.	Employee involvement
8.	Employee training
9.	Trustworthy teamwork
10.	Employee empowerment

Source: Davenport *et al*. (1998), Choi (2000), Moffett *et al*. (2003) &Hasanali(2013) cited in Boondao (2013)

Table 2.5: KM best practices

S/N	KM practice
A.	**Determining the organisation's Knowledge and Know-how**
	1. Identifying existing knowledge sources
	2. **Knowledge organisation**& Assessment: The process of mapping, categorizing, indexing, and evaluating organisational knowledge assets.
B.	**Tactical Knowledge Management Best Practices**
	1. Knowledge Sharing
	2. Knowledge Reuse
	3. Enabling knowledge sharing
	4. Creating suitable work related environments.
	5. Providing access to collaborative IT systems.
	6. Providing access to relevant data and information
	7. Common IT systems
	8. Interaction and socialization
	9. Involvement of partners in definite organisational procedures
	10. Cultural orientation
C.	**Strategic Knowledge Management Best Practices**
	1. Identifying what the firm knows, and what its main expertise is.
	2. Leveraging knowledge assets across the organisation.
	3. Building the right know-how and skill to match strategic requirements.
	4. Isolating and removing/changing obsolete knowledge.
	5. External Networking
	6. Continued use

Source: Frost (2010)

Table 2.6: Harmonized list of KM practices from reviewed literature for this study

S/N	KM Dimensions	S/N	KM practices
1.	Orientation towards the development, transfer and protection of knowledge	1.	Accessing relevant information through availability of Information technologies and systems
		2.	Employee encouragement to share knowledge (Knowledge sharing)
		3.	Using accessible knowledge in decision making.
		4.	Providing access to collaborative IT systems.
		5.	senior management support and commitment
		6.	Creating suitable work related environments.
2.	Continuous learning in the Organisation	7.	Stimulation of continuous learning
		8.	Employees training
		9.	Generating new knowledge.
		10.	Facilitating knowledge growth through culture and incentives.
		11.	Knowledge Reuse
		12.	knowledge-friendly culture
3.	An understanding of the Organisation as a global system	13.	Encouraging knowledge transfer
		14.	Sharing of best practices
		15.	Knowledge capturing / re-use
		16.	Transferring existing knowledge into other parts of the organisation.
		17.	Accessing valuable knowledge from outside sources.
4.	Approach based on individuals	18.	encourages teamwork
		19.	Interaction and socialization
		20.	Innovation and knowledge creation.
		21.	Motivating workers to develop, share, and use knowledge
5.	Competence development and management based on competences	22.	Benchmarking techniques to improve its employees' competences.
		23.	Building the right know-how and expertise

Source: Marque's and Garrigo'simon (2006);Frost (2010);Boondao (2013);Uriarte (2008);Dalkir (2005)

After what different authors have stated on Knowledge management practice.A harmonized list of Knowledge management practice was developed based on the KM practice attributes identified by researchers stated earlier on, which are presented in Table 2.6. Most of the KM practices listed in table 2.6 were adopted from Marque's and Garrigo'simon (2006).Most researchers grouped KM practices into some dimensions and stated that it can be adopted by knowledge intensive industries such as the construction industry. Frost (2010) also stated that, the scope of Knowledge management is difficult to define and its effects are hard to measure. Therefore, hecame up with a summary on Knowledge management best practices which were likewise adopted in this research in addition to some Knowledge management practice attributes highlighted earlier.

2.6 Effect of Knowledge Management Practices on Organisational Performance

To effectively acquire and manage organisational knowledge, the advent of knowledge-based economy has made it a strategic necessity for organisations to seek ways to improve their knowledge base which has effect on firm performance (Sarkindaji*et al*., 2014). It is also stated that there are no totally agreed way to measureorganisational performance among researchers and professionals (Ghalomi*et al*., 2012).As argued by Anumba*et al.* (2005) that measuring of performance of knowledge assets and KM is to explain its business benefits so that the source of informationand assistance necessary to successful put it into effect can be provided. According toDave and Koskela (2010)knowledge has been recognised to be an important asset to an organisation, which when used effectively can provide competitive advantage. In a research carried out by Tseng (2014) in examining the relationship between KM competency, supplier-relationship management and corporate performance. Tseng (2014) established that, KM has capabilities that are important in such

a way that it has apositive effect on corporate performance, as well as supplier-relationship management.

According to Robinson *et al.* (2001) the Key Performance Indicators (KPIs) revealed for the construction industry display a growing significance devoted to performance problem. Current initiatives such as the Construction Best Practice Programme and Construction Productivity Network are developed as a reaction to the increasing necessity to share knowledge of best practice in the construction sector and to improve performance. Lin and Wei (2005) also carried out aresearch on key performance indicator it establishes that,KM brings standards to differentoperating stages. However, its performancemust be measured to enhance the effective use of limited resources provided to knowledge management.

Construction organisations according to Anumba*et al.* (2005) show that,KM is increasingly recognized to be important. However, problems such as the link between KM and business performance are not clearly understood and secondly there is often a lack of appropriate tools to track the impact of KM and knowledge assets. This makes it considerabledifficult to demonstrate associated benefits of KM. Many organisations have recognized this, but appropriate methods are not always put in place to evaluate the performance of knowledge assets and KM projects, programmes or initiatives. According to Robinson *et al*. (2005) variety of performance measurement approaches have emerged that can be grouped as follows:

1. Metrics approaches.
2. Economic approaches.
3. Market value approaches.

2.6.1 Metrics approaches

This approach is based on the belief that, there are relationships that exist between the indicators and organisational performance. Metrics can be single or composite which entails a collectionof individual indicators into a unit item.The output indicator can be used to determine the outcome of an action, such as the level of defects recorded after completing a work, also in terms of client satisfaction, completion within budget and within the desired duration (Robinson *et al*., 2005).

2.6.2 Economic approaches

Metrics approach is seen to be based on the implied assumption that, making better metric scores could result in enhancing theperformance of an organisation. Economic approaches on the other hand are more clear and obvious in attempting to calculate the actual contributions or net benefits (Robinson *et al*., 2005).

2.6.3 Market value approaches

The market value approach is based on the most important principle that, the value of a company comes from physical and monetary assets and soft knowledge or employee's knowledge. Employees' knowledge should explain the difference between the values given to an organisation by a buyer or the stock market in relation to the excepted value to be derived (Robinson *et al*., 2005).

2.7 Project Performance

Project involves a single, definable purpose and well-defined end-items usually specified in terms of cost, schedule and performance (Nicholas and Steyn, 2008). The construction industry according to Anumba*et al.* (2005) is a project-based industry. Its business is

organized around projects, which are delivered by specialized skilled organisations working togethertemporarily. However poor project performance, such as time delays, cost overruns, are not rare in construction projects. These problems have attracted the attention of construction specialists and academics in the industry (Lo *et al*., 2006 and Meng, 2012). Project performance is shown in terms of time, cost and quality conditions because completion on time, within the required budget and with the required quality has been widely viewed as the three primary goals of project success (Meng, 2012).

Time, cost and quality according to Constructing excellence (2004) are interdependent and often in conflict. In most scenarios the priorities of the projects will fall into the areas shown as B, C or D in fig 2.2, where two of the three conditions are identified as most important to project success. It is uncommon for time, cost and quality to be equal in either importance or impact.

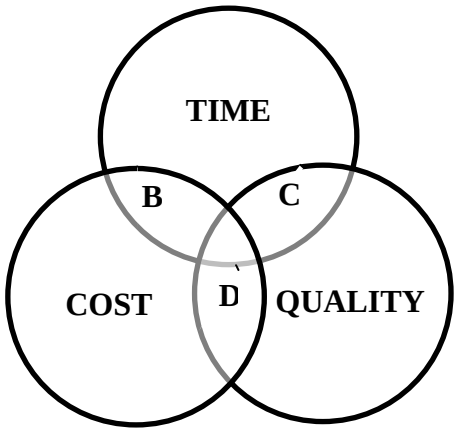


Figure 2.2: Interdependency of time, cost and quality

Source: (Constructing excellence, 2004)

2.7.1. Project time

Time certainty according toTsongas (2011)refers to the actual time required to produce the end result of a project. The extent of time necessary to yield the deliverable will be directly related to the amount of requirements that are part of the end result along with the amount of resources allocated to the project.

2.7.2 Project cost

Cost of project according to Chandra (2008) represents the total of all items of expense associated with a project which are supported by long-term funds. In a research carried out by Kasimu*et al.* (2013) it was highlighted that, oneof the potential benefit of adopting knowledge management can be in form of improvement of cost of project delivered.

2.7.3 Project quality

Quality of a project according to Nicholas and Steyn (2008) implies that, the product is fit for its purpose and, also implies meeting a specification. Improvement of quality of project delivered was found in a study carried by Kasimu*et al.* (2013) to be one of the potential benefits that can be derived from the adoption of KM in Nigerian civil construction firms.

CHAPTER THREE

3.0Research Methodology

3.1 Introduction

The methodology of any research is the process used to collect information and data for the purpose of making a contribution tothe area of a study. The process in this research involves assessing the construction professionals' opinion through the collection of detailed data of the existing condition affecting knowledge management practices and using the data collected to explain the current conditions in order to make improvement in the construction industry. The use of structured questionnaires was adopted by the following researchers in KM they include but not limited to Marque's and Garrigo'simon (2006), Sodiya*et al*., (2006),Kasimu*et al*., (2013) and Oke*et al*. (2013). Therefore this research adopted the use of questionnaires in collection of data from respondents due to some reasons highlighted in the next section.

3.2 Research Methods Adopted For the Study

The research methods adopted for this study is in form of quantitative research which seek respondent responses in an attempt to examine area of study under investigation. The use of questionnaire survey was 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 acquired 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. Questionnaire survey is also used for scientific purposes which provide relevant information for all kinds of research fields about the current situation on the ground, psychological perception and views of the population. In that light, a questionnaire survey is deemed more suitable for the collection of data for this research as a result of the

complexity, fragmentation and diversification of the construction companies as described byKasimu*et al.*(2013).

3.3 Data Collection Technique

The use of questionnaire was adopted in this study. It was well-structured and detailed using sources from literature review. The opinion of the respondents served as a primary source of data for the research which was obtained through self-administered questionnaires and the secondary source of data was obtained through books, journals, articles, periodicals, electronic resources etc. Questionnaires are commonly distributed through mails, telephone etc. In this study questionnaires were self-administered and retrieved over a period of five months (between August 2015 and December 2015) to various construction firms in Abuja.

3.4 Population Size

Population size of1962was used in this study which constitutes numbers of registered construction firms within Abuja as retrieved from Corporate Affairs Commission (CAC, 2014). The professionals in those firms served as the respondents, a random sampling method in form of multi-stage random sampling method was adopted. This was carried out by sampling construction firms which serves as the Primary Stage Units (PSU), and then the professionals in the sampled firms served as the Second Stage Unit (SSU). However, all the firms sampled had an equal chance to be assessed or selected. Obtaining data involves eliciting information on area of study from construction professionals in construction firms sampled in Abuja focusing on knowledge workers in the construction industry which includes Engineers, Quantity Surveyors, Estate Surveyors, Architects, and Builders in Nigeria.

Construction firms in Abuja constitute the population of the study and construction professionals in those firms served as the respondents as highlighted earlier. 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).

3.5 Sample Size

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 also lead to inaccurate results as well (Six-sigma, 2007). Cochran's (1977) stated that when the value of sample size (n)is calculated andit is higher than the original value contemplated, then the desired standard of precision can be relaxed so as to permit the use of smaller value of Sample size(n).

Thus sample size in this research was calculated based on Cochran's formula for determining sample size, which yielded sample sizes (n)of 209and 450. According to Cochran's formula cited in Bartlett *et al*. (2001) when there is a much difference between the two values of sample sizes(n's) calculated. It is permitted according Bartlett *et al*. (2001) to use the smaller value of sample size (n) where budget or standard of precision is substantially greater than the original sample planned. Thus sample size for this study is obtained as shown;

Cochran's (1977) formula for determining sample size

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

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

$\underline{n}=\frac{n0}{(1+\frac{n0}{\text{population}})}$ (correction formula for final sample size)

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%).

Therefore, $s=\frac{5}{4}= 1.25$

Where "d"= acceptable margin of error for mean being estimated = 0.20, "d" is obtained as shown (Number of point on scale * acceptable margin of error - ± 4%) = $\frac{4}{100} * 5= 0.20$

According to Bartlett*et al.* (2001) a margin of error between 3% and 5% is acceptable for educational and social research.

Population (N) = 1962 (representing number of registered construction firms in Abuja)

$\underline{n}_0 =\frac{t^2 * S^2}{d^2}= \frac{(1.96)^2 * (1.25)^2}{(0.20)^2}= \frac{3.842* 1.563}{0.04}$

$\underline{n}_0 = \frac{6.01}{0.04}= 150$. Therefore$\underline{n}_0 = 150$ the value for$\underline{n}$ can be obtained as presented

$\underline{n}=\frac{n0}{(1+\frac{n0}{\text{population}})}$ (correction formula for final sample size)

$$\underline{n}=\frac{150}{(1+\frac{150}{1962})}$$

$$\underline{n}=\frac{150}{1+0.076}=\frac{150}{1.08}=139$$

Where 50% additional sample is added to the corrected sample size ($\underline{n}$)for lost questionnaires or uncooperative respondents as recommended by Salkind cited in Bartlett*et al.* (2001);

Therefore, final sample size is obtained as shown:

$\underline{n}_2 = 139 \times 0.50 = 69.5 + \underline{n} = 69.5 + 139 = 209$

Moser and Kalton citedin Abubakar *et al*. (2014) highlighted that, a survey could be considered meaningful if the response rate is between below 30% -40% obtained. Therefore, the study administered 209questionnaires toconstruction firms where professionals in those firms served as respondents in Abuja, FCT. Construction Firms as categorized by Udechukwu cited inAbdul'Azeez (2012) is in three components namely:

1. Micro enterprises,
2. Small enterprises and
3. Medium enterprises

This has a corresponding employee's size of 0 to 9, 10 to 99 and 100 to 299 respectively.Odediran (2012) classified construction firms also intosmall, medium and large in Nigeria. The nature of the large firms (over 300 workers) are said to have large numbers of foreigners, with a number of locally based company that characterizes the medium size

firms and small size firms. Therefore, construction professional in these firms that is the large, medium, small and micro served as source of primary data for this research.

3.6 Questionnaire Design

In designing the questionnaire, the objectives of the study were first set up. This was done to help in deciding what questions to ask, how to ask them and to ensure that the responses received would be relevant for the study.

The questionnaire consists of four sections related to the study which entails the respondent/ organisation information, Knowledge management practice attributes in construction firms in the FCT Abuja, factors affecting the capture and re-use of project knowledge andfinally,perceived effect of knowledge management practices on project performance in term of cost, quality and time.

Section A - General Information about the company and respondent

First of all, six multiple choice questions and an open ended question was developed which entails questions on the name of the company, profession of the respondent, qualification of the respondent, years of experience of the respondent,year of existence of construction firms, the company size and lastly, a question asking if the company has branch elsewhere.

Section B – Importance of Knowledge management practice attributes in the construction industry

This section attempts to assess the level of agreement with respondents how they strongly agree or disagree with the Knowledge management practice attributes identified in this study in the construction industry and also the set of practices adopted by each firms. Using likert scale of 1-5 which is defined as follows: Strongly agree, Agree, Neutral, Disagree and Strongly disagree.

Section C -The factors that affect the capture and re-use of project knowledge

Under this section the respondent where 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.

Section D - The perceived effect of KM practices on project performance in terms of Time, Quality and Cost.

In this last section a 1-5 likert scale was designed for project performance indicators.The scale was designed to assess the effect of knowledge management practice attributes on project performance in relations to time, cost and quality. The likert scales as defined were, No impact, Very low impact, low impact, moderate impact and very high impact for Cost, Quality and Time of a project.

3.7Data Analysis

The data for this research was analysed using descriptive and inferential analysis. This analysis was carried outwith the aid of SPSS 20.0. According to Howell (2011) SPSS is windows based program that can be used to execute data entry and analysis. According to Gallen (2010) SPSS is a wide-ranging system for data analysis. It can take data from almost any nature of file and use them to develop tabulated reports, charts, and descriptive statistics. It can treat large quantity of data and perform all the analyses. SPSS is commonly used in the Social Sciences and in the business world.It is updated time to time and different version of it is often produced (Howell, 2010).SPSS is the abbreviation of Statistical Package for the Social Science which is now Statistical Product and Service Solution. SPSS

is one of the most popular statistical packages which can perform highly complex data manipulation and analysis with simple instructions (Gallen, 2010).

3.7.1 Descriptive analysis

Descriptive statistics provides numerical and graphic methods to summarize a collection of data in a different and clear manner.In examining numerous collections of numbers it is helpful to be able to present a number that gives a summary of the data. This numbers are called descriptive statistics. The arithmetic mean is likely the most common descriptive statistics. The mean is often called the average, but it is actually one of numerous types of averages, such as the median and the mode.

Some other examples can include frequency distributions, measures of central tendency that is mean, media, mode, pie charts and bar charts can be used to describe data. The data obtained in this research was analysed by determining their corresponding frequency, percentage and mean. However, frequency, percentage and mean are used in this study to determine the level of importance of statements/items under examination.

3.7.2Inferential statistics

Inferential statistics are used to make reasonable conclusion upon analysing of a data. It is usually used to indicate the thoughts of a population. In a situation when we need to measure the average performance of one or more groups the use of inferential test can be essential. We use it to make reasonable conclusion on a data to a general condition. This study usedRelative Importance Index (RII) and Chi-squareto draw conclusion on data analysed. Similar approach was used by Meng (2011) in a study carried out on the effect of relationship management practices on project performance.

3.7.2.1 Chi-Square

Prediction can be made on the outcome of a score which can be used to decide on the physical power of something as it's related to something. Prediction connected with Chi-square is usually 0.05 below which can be used to state the independent variable to be used to predict scores on the dependent variable. Chi-square test is used to find out the connections between two set of variable. Therefore in this study the association between knowledge management practices attributes and project performance indicators as widely recognized in terms of Cost, Quality and Time was examined using the Chi-square test. The formula for Chi-square is presented as show in the equation 3.1.

$$X^2 = \frac{\sum(O-E)^2}{E} \quad \text{.....3.1}$$

Where O represents observed values and

$$E = \frac{Row\ total \times Column\ total}{Sample\ size} \quad \text{.....3.2}$$

Source: (Elementary statistics, 2000)

According to Elementary statistics (2000) bivariate and multivariate statistics are suitable not only for statistical explanations, but they constitute a largepart of social science research. The social sciences are concerned with explaining social phenomena and this necessarily for testing for association among variables. Phi ($^2 = \frac{x^2}{n}$), Contingency coefficient ($c = \sqrt{\frac{x^2}{n + x^2}}$) and Cramer's V ($V = \sqrt{\frac{2}{t}}$) are used in chi-square for determining level of significant association between independent variables that is KM practice attributes

and dependent variables that is project time , project cost and project quality. The values of significant level calculated for performance are shown under appendix III.

In analysing with SPSS, the P-values results that is asymptotic values for linear by linear association computed under the chi-square test was used because according to Kang (2004) it is stated that linear by linear association test is a test for trends in a larger than 2 × 2 table. Cohen (2008) stated also that, Pearson Chi-Square results can be doubtful when one or more cells contain less than five observations.

Table 3.1: Guide to level of association

S/N	Level ofassociation	Rating
1	Significant association	When less than 0.05
2	Marginal association	When Greater than 0.05 but less than 0.10

Source: Waroonkun and stewart cited in Meng (2012)

3.8.2.2 Relative importance index

In this study Relative importance index (RII) was used to rank the perception of construction professionals on area under study. This was obtained as presented:

$$\text{Relative Importance Index (RII)} = \frac{\sum fx}{\sum f} \times \frac{1}{k} \quad \ldots\ldots 3.3$$

Where,

$\sum fx$ = Total weight given to each attributes by the respondents.

$\sum f$ = Total number or respondents in the sample.

K = Highest weight on the likert scale.

When computed the item with the highest RII value will be ranked first and the subsequent one will be ranked second, third respectively.

The rating of all items/statementswas subjected to a guide showing degree of significance on the value of relative importance index (RII) computed for each item/statement. The guide is presented in Table 3.2.

Table 3.2: Guide to degree of significance

S/N	Degree of significance	Rating
1	Very significant	0.76 above
2	Significant	0.67-0.75
3	Fairly significant	0.45-0.66
4	Not significant	0.44 below

Source: (Vanduhe, 2012)

CHAPTER FOUR

4.0 DATA PRESENTATION, ANALYSIS AND DISCUSSION

This section of the study gives details of how data for this research is being obtained fromthe `field survey. The analysis of the data, presentation and discussion of findings as they relate to the objectives of the study is also presented under this chapter. In the study questionnairesadministered totalled 209 which was distributed to construction firms and filled by professionals in those construction firms within Abuja as shown in Table 4.1.

Table 4.1: Details of Questionnaires Administered and Returned

	Sample size	No. Of Questionnaires distributed	No. of Questionnaires returned	Percentage of Returned
Construction firms	209	209	113	54.07%

Source*: Field Survey* (2015).

Table 4.1 described the responsiveness of questionnaires returned from the field survey, a total of 113 questionnaires were returned from 209 questionnaires distributed making up 54.07% returned questionnaire which is considered meaningful according Moser and Kalton cited in Abubakar*et al*. (2014) since the response rate is not below 30% - 40%. However, two of the questionnaires were incorrectly filled showing questions not properly understood which led to 111 numbers of responsive questionnaires that constitute 53.11% of the total questionnaires distributed. Therefore, 111 questionnaires were used for the analysis.

4.1 Demography of Company and Respondents

This section contains the data of the respondents and their firms such as the nature of the construction professionals, company size,professional's qualification,years of experience of professionals and years of existence of firm. This data were necessary for the research to give a better picture of the respondents.

4.1.1 Construction professional

The professional's making up the respondents in this research are showed in Figure 4.1, consisting of Architects, Builders, Quantity Surveyors, Engineers and Estate Surveyors. They are identified to be knowledge workers according to Anumba*et al*. (2005).

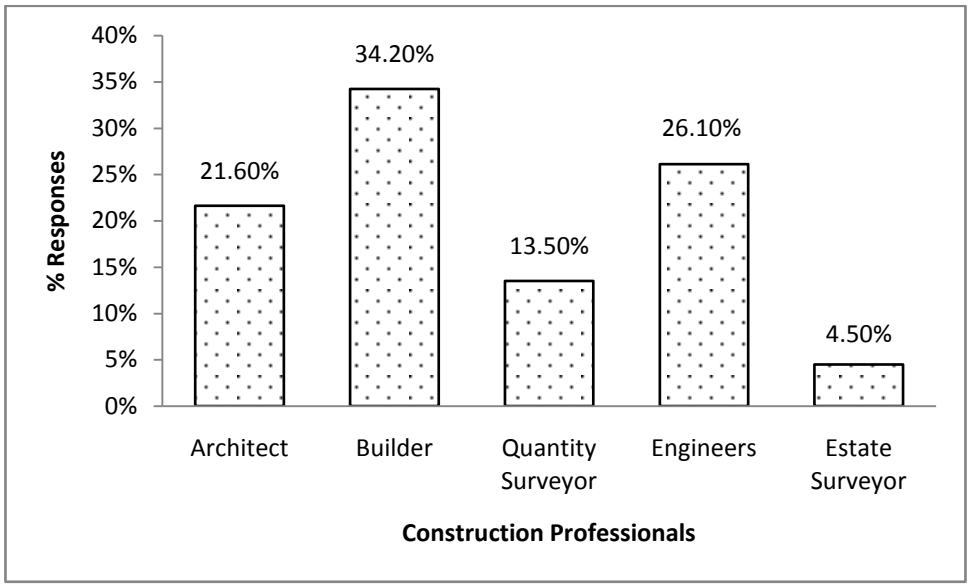


Figure 4.1:Percentage responses of construction professionals

Source: Field Survey, (2015).

As shown in figure 4.1, 21.60% of responses acquired 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 are 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

sixthand eighth respectively. The reason stated earlier could be the possible cause why the highest responses were acquired from Builders at a percentage of 34.20 in this study.

4.1.2 Construction firm size

The firms assessed in this study consist of Micro size firms (0-9 workers), Small size firms (10-99 workers), Medium size firms (100-299 workers) and large size (over 300 workers) firms as shown in figure 4.2. 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 acquired from small size firms (10-99 workers) which shows that they constitute a larger portion of responses in this study. In a research carried out by Egbu*et al*. (2003) on small and medium size construction firms, it was observed that these enterprises have challenges implementing KM initiatives. Therefore responses from these categories of firms are considered to be very relevant to this study.



Figure 4.2: Characteristics of company response rate
Source*: Field Survey* (2015).

4.1.3 Qualification of professionals

The qualification of the respondents that, provided information for this research is shown in figure 4.3. As observed 17.1% of the respondents have Higher National Diploma (HND) and 48.6%, 29.7%, 4.5%has a qualification of Bachelor's degree, Masters, Post graduate diploma (PGD) respectively. It could be seen in this study that, professionals with Bachelor's degree are those that readily took part in the research as they make up the larger percentage of the responses. This could be that, professionals with such qualification practice or have more knowledge on area under study.

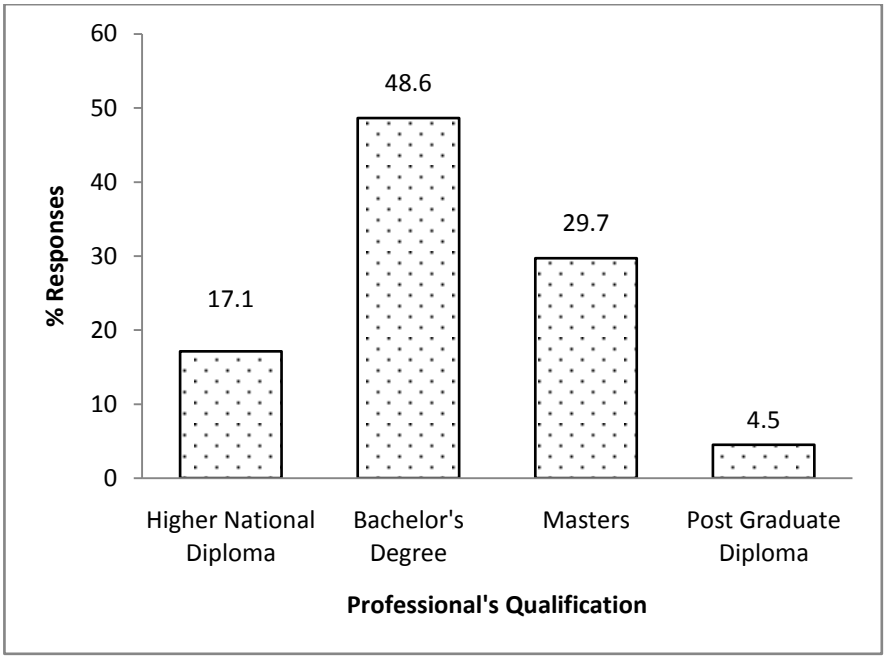


Figure 4.3: Academic qualifications of construction professionals

Source*: Field Survey* (2015).

4.1.4 Professionals' year of experience

The years of experience of respondents that took part in this research is shown in figure 4.4. Responses of 26.1% was obtained from professional's with construction experience between 0 to 4 years, 55% of the professional has experience between 5 to 10 years,

followed by respondents with 11 to 15 years of experience making up 8.1% and lastly 10.8% responses were from construction professionals with above 16 years of experience in the field of construction. As it is observed 55% of professionals with experience between 5 and 10 years provided the highest percentage of responses. This seems to suggest that professionals between 5 to 10 years of working experience are many in the construction industry in Abuja than any other professionals with other years of experience.Also it could be observed that respondents' having these years of experience finds easiertime to provide data for the area under study or could be that they are highly populated than other professionals with other years of experience.

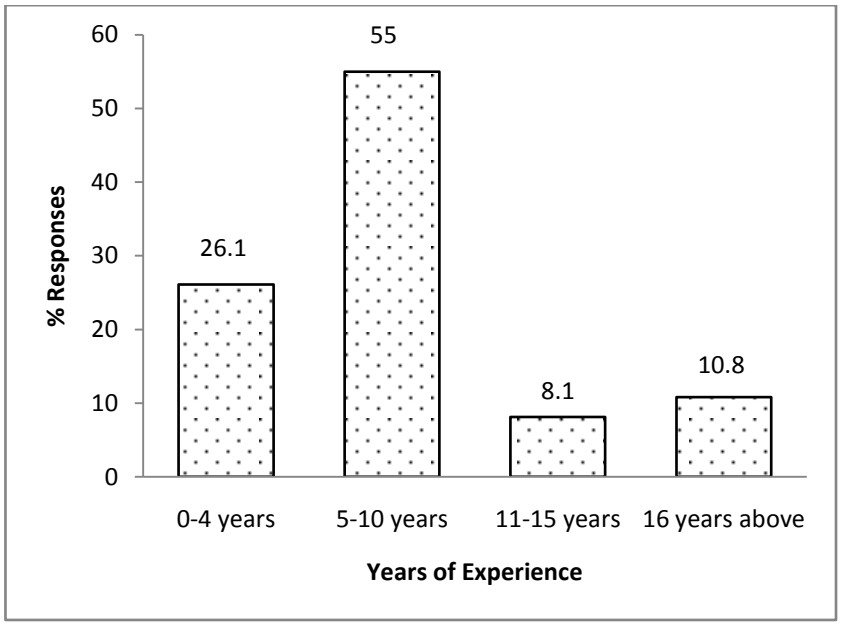


Figure 4.4:Construction professional's year of experience
Source*: Field Survey* (2015).

4.1.5 Company years of existence

The years of existence of construction firms is shown in figure 4.5. Percentage responses of 18.9% were provided from firms with 0 to 5 years of existence, 43.2% responses were obtained from firms with 6 to10 years of existence, 21.6% of responses were obtained from

firms with 11to15 years of existence, 13.6% of responses were obtained from firms with 16 to 20 years and lastly 3.6% responses were obtained from firms with over 21 years of existence.As observed form the data collected the highest response rate was acquired from firms that have existed between 6 and 10 years. This shows that these firms (6-10 years) might have been practicing KM in one way or the other.

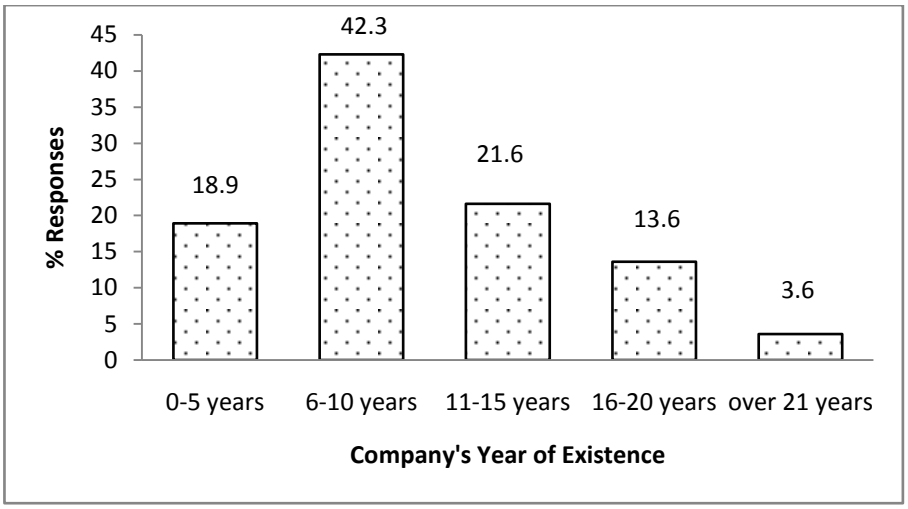


Figure 4.5: Company's year of existence

Source*: Field Survey* (2015).

4.1.6 Job execution

Table 4.2 shows construction firmsresponses on job execution outside Abuja. It was observed in the study that, 54% of the construction firms have projects outside Abuja while 43.2% of the firms examined do not currently have projectsoutside Abuja because of unavailability of projects contract outside Abuja or to some reasons not made known. However, 2.7% of the construction firms did not specify whether they do have projects outside Abuja or not. As observed most firms observed in this study have executed jobs outside Abuja which shows that information provided in this study entails experience of professionals cutting across all the state in Nigeria which was considered meaningful for

this research. Significantly, outcomes from the firms' demographic profilemakes it known that, respondents' are well knowledgeable and educatedenough to reply to this study questions.

Table 4.2: percentage of firms executing jobs outside Abuja

	Company branch elsewhere				
S/N	**Responses**	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
1	Yes	60	54.1	54.1	54.1
2	No	48	43.2	43.2	97.3
3	Unspecified	3	2.7	2.7	100.0
	Total	111	100.0	100.0	

Source: Field Survey (2015).

4.2 Assessment of Knowledge Management Practices

4.2.1 Assessment ofprofessionals' perception on knowledge management practice attributes

Table 4.3 shows the Relative Importance Index (RII) of various professionals' perception on KM. The respondents' perceptions on the identified knowledge management practice attributes in the construction industry were shown with RII between0.83 and 0.66 for Architects, 0.88 and 0.63 for Builders, 0.87 and 0.49 for Quantity Surveyor, 0.92 and 0.71 for Engineers and, 0.92 and 0.16 for the Estate Surveyors. RII between 0.92 and 0.16 indicates that, some of the Knowledge Management Practice attributes as identified in this study were found to be very significant, significant, slightly significant and not significant to the construction industry based on various professionals' perception.

This assessment on Knowledge Management Practice attributes is presented in tables 4.3 for various professionals. It was observed that, "Team encouragement to share knowledge" was ranked first by Architects (SD = 0.797, RII = 0.83) andBuilders (SD = 0.638, RII =

0.88) showing that both professionals' view the attribute to be the most important to construction industry. "Transferring of existing knowledge into other parts of the organisation" and "Encouraging knowledge transfer" was rankedfirst by Quantity Surveyors (SD = 0.488, RII = 0.87) and Engineers (SD = 0.494, RII = 0.92) which shows that, it is viewed to be very important with their corresponding values of RII. Finally, "Stimulation of continuous learning" was ranked the most important KM practice attribute by Estate surveyors (SD = 0.548, RII = 0.92). In the overall assessment the general view of professionals' saw "Team encouragement to share knowledge" (RII = 0.87) to be ranked first as the most important KM practice attributes in the construction industry.

Therefore, it is inferred in this study that, encouraging team work among project team is a relevant way of practising KM in the Nigerian construction industry which supports Anumba*et al*. (2005) view that teams of knowledge workers improves the practices of KM in an organisation as important knowledge are been shared during the process of socialisation.

Table 4.3: Assessment of professionals' perception on knowledge management practice attributes

S/N	Knowledge management practice attributes	Construction professionals																
		Architect's			Builder's			Quantity Surveyor's			Engineer's			Estate Surveyor's			Over all	
		SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	RII	RANK
1.	Accessing relevant information pertaining to task	0.761	0.75	11th	1.005	0.75	17th	0.743	0.83	4th	1.067	0.79	19th	1.095	0.64	8th	0.77	17th
2.	Knowledge sharing	0.761	0.75	11th	0.820	0.75	16th	0.594	0.79	8th	0.577	0.85	12th	0.548	0.44	15th	0.79	8th
3.	Using accessible knowledge in decision making	0.884	0.71	19th	0.834	0.76	14th	0.743	0.83	4th	0.604	0.86	8th	0.000	0.80	5th	0.79	12th
4.	Providing access to collaborative IT systems	1.141	0.71	20th	0.751	0.65	22nd	0.704	0.75	12th	1.083	0.72	22nd	0.000	0.80	5th	0.70	22th
5.	Senior management support / commitment in knowledge creation sharing and use	1.251	0.80	4th	1.018	0.77	12th	0.961	0.75	15th	1.082	0.76	21st	0.548	0.92	1st	0.78	14th
6.	Creating Suitable work related environment	1.274	0.77	10th	1.160	0.74	18th	0.655	0.80	7th	0.944	0.81	17th	0.000	0.60	11th	0.77	18th
7.	Stimulation of Continuous Learning	1.209	0.73	18th	0.945	0.63	23rd	1.242	0.68	21st	0.841	0.86	9th	0.548	0.92	1st	0.73	20th
8.	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	1.213	0.78	7th	1.224	0.69	19th	1.113	0.73	17th	0.882	0.86	10th	1.095	0.64	8th	0.76	19th
9.	Generating new knowledge	1.096	0.68	22nd	1.146	0.67	21th	0.961	0.75	15th	0.739	0.85	13th	0.548	0.68	7th	0.73	21th
10.	Facilitating knowledge growth through culture and incentives	0.751	0.66	23rd	1.130	0.68	20th	0.516	0.69	18th	0.686	0.71	23rd	1.095	0.64	8th	0.68	23th
11.	Knowledge reuse	0.834	0.70	21st	0.972	0.81	6th	0.414	0.84	2nd	0.655	0.80	18th	3.440	0.84	4th	0.79	13th
12.	Knowledge-friendly culture	0.794	0.75	13th	0.865	0.76	15th	0.737	0.68	19th	0.614	0.87	6th	0.548	0.24	19th	0.77	15th
13.	Encouraging knowledge transfer	0.830	0.78	5th	0.475	0.83	3rd	0.414	0.76	10th	0.494	0.92	1st	0.548	0.24	19th	0.84	2nd
14.	Sharing of best practices	1.073	0.75	14th	0.547	0.83	4th	0.724	0.67	22nd	0.670	0.87	7th	0.000	0.60	11th	0.80	7th
15.	Knowledge capturing/re-use	0.806	0.74	15th	0.509	0.82	5th	0.594	0.79	8th	0.581	0.77	20th	1.095	0.84	3rd	0.82	11th
16.	Transferring of existing knowledge into other parts of the organization	0.776	0.77	8th	0.868	0.79	9th	0.488	0.87	1st	0.384	0.83	14th	0.548	0.24	19th	0.82	4th
17.	Accessing valuable knowledge from outside sources	1.076	0.78	6th	0.520	0.80	7th	1.302	0.49	23rd	0.639	0.83	16th	0.548	0.24	19th	0.79	9th
18.	Team encouragement to share Knowledge	0.797	0.83	1st	0.638	0.88	1st	0.775	0.84	3rd	0.501	0.92	2nd	0.000	0.60	11th	0.87	1st
19.	Interaction and socialization	0.970	0.73	17th	0.704	0.76	13th	0.737	0.68	19th	0.733	0.88	5th	0.548	0.36	16th	0.76	16th
20.	Innovation and knowledge creation	0.917	0.77	9th	0.636	0.79	8th	0.704	0.75	12th	0.509	0.90	3rd	1.643	0.16	23rd	0.81	5th
21.	Motivating workers to develop ,share and use knowledge	0.659	0.80	3rd	0.565	0.86	2nd	0.414	0.76	10th	0.942	0.90	4th	1.095	0.36	18th	0.84	3rd
22.	Benchmarking techniques to improve its employees' competences	0.806	0.74	15th	0.594	0.77	11th	0.704	0.75	12th	0.435	0.85	11th	0.548	0.36	16th	0.79	10th
23.	Building the right know-how and expertise	0.690	0.81	2nd	0.559	0.78	10th	0.000	0.81	6th	0.602	0.83	15th	1.643	0.52	14th	0.80	6th

Source: Field Survey (2015)

4.2.2 Level of adoption of knowledge management practices by construction firms

Table 4.4 presents the percentage rate of adoption of knowledge management practices by Micro, Small, Medium and Large size firms in construction industry in Abuja. The result of the firms' responses is presented in table 4.4 and discussions are made for each items/statements representing Knowledge Management practice attributes.

Table 4.4:Percentage adoption of Knowledge Management Practices by construction firms

S/N	Knowledge Management practice Attributes	N	Company type/ Company size							
			Micro size firm (0 - 9 workers)		Small size firm (10 - 99 workers)		Medium size firm (100 - 299 workers)		Large size firm (over 300 workers)	
			Percentage of KM practiced in various firms		Percentage of KM practiced in various firms		Percentage of KM practiced in various firms		Percentage of KM practiced in various firms	
			YES	NO	YES	NO	YES	NO	YES	NO
1.	Accessing relevant information pertaining to task	111	29.41	70.59	30.77	69.23	45.45	54.54	66.67	33.33
2.	Knowledge sharing	111	15.00	85.00	36.92	63.07	22.22	88.89	84.21	15.79
3.	Using accessible knowledge in decision making	111	50.00	50.00	29.23	70.76	20.00	80.00	72.22	27.78
4.	Providing access to collaborative IT systems	111	17.64	82.35	18.46	81.54	27.27	72.73	55.56	44.44
5.	Senior management support / commitment in knowledge creation sharing and use	111	17.64	82.35	33.85	69.15	45.45	54.55	83.33	16.67
6.	Creating Suitable work related environment	111	29.41	70.59	16.92	83.07	72.72	27.27	55.56	44.44
7.	Stimulation Of Continuous Learning	111	15.00	85.00	33.84	66.15	62.50	37.50	72.22	27.78
8.	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	111	17.65	82.35	27.69	72.31	45.45	54.54	72.22	27.78
9.	Generating New Knowledge	111	11.76	88.24	35.38	64.62	27.27	72.73	55.56	44.44
10.	Facilitating Knowledge growth through culture and incentives	111	26.32	73.68	21.54	78.46	11.11	88.89	72.22	27.78
11.	Knowledge Reuse	111	17.65	82.35	21.54	78.46	54.55	45.45	55.56	44.44
12.	Knowledge-friendly Culture	111	64.71	35.29	12.31	87.69	27.27	72.27	27.27	72.27
13.	Encouraging knowledge transfer	111	29.41	70.59	20.00	80.00	45.45	54.55	72.22	27.78
14.	Sharing of best practices	111	26.32	73.68	12.31	87.69	20.00	80.00	55.56	44.44
15.	Knowledge capturing/re-use	111	17.64	82.35	12.30	87.69	27.27	72.72	55.56	44.44
16.	Transferring of existing knowledge into other parts of the organisation	111	35.29	64.70	24.62	75.38	45.45	54.55	55.56	44.44
17.	Accessing valuable knowledge from outside sources	111	47.06	52.94	46.15	53.85	27.27	72.73	72.22	27.78
18.	Encouragement of team to share knowledge	111	35.29	64.71	24.62	75.38	45.45	54.55	55.56	44.44
19.	Interaction and socialization	111	47.05	52.94	46.15	53.85	27.27	72.73	72.22	27.77
20.	Innovation and knowledge creation	111	58.82	41.18	55.38	44.62	90.00	10.00	94.74	5.26
21.	Motivating workers to develop, share and use knowledge	111	47.05	52.95	24.62	75.38	88.89	11.11	90.00	10.00
22.	Benchmarking techniques to improve its employees' competences	111	17.64	82.35	15.38	84.62	27.27	72.73	55.56	44.44
23.	Building the right know-how and expertise	111	47.05	52.95	29.23	70.76	45.45	54.54	66.67	33.33
	KM practiced on the average (%)		31.34		27.36		39.37		60.71	

Source: Field Survey (2015)

The results of level of adoption of KM as shown in Table 4.4 are discussed as follows:

4.2.2.1 Accessing relevant information

Out of the responses acquired from construction micro size firms, 29.41% of the firms provide access to relevant information while 70.59% of the Micro size firms do not give much attention to the practice. The small size firms that adopt the practice are 30.77% while 69.23 % do not give much attention to the practice. It was again observed that 45.45% of the medium firms have access to relevant information while 54.54% of the firms under this category don't have access to relevant information. The large firms with over 300 Employee stated that, they have access to relevant information were 66.67%while 33.33% of the firms in this category don't have much access to relevant information.

4.2.2.2 Knowledge sharing

In the study Knowledge sharing was practiced by 15% of the Micro firms observed while 85% of the firms under this category do not give much attention to it. 36.92% of the Small firms as observed in this research practice knowledge sharing while 63.07% of this firm do not give attention to practice of knowledge sharing. 22.22% of the Medium size firm practice knowledge sharing while 88.89% do not give much attention to knowledge sharing.84.41% of the large size firms in the construction industry in Abuja as observed in this research practice knowledge sharing while 15.79% of firms under this category do not given much attention to the practice of knowledge sharing.

4.2.2.3 Using accessible knowledge in decision making

As observed in this research 50% of the Micro firms assessed, use accessible knowledge in decision making while 50% don't give much attention to the practice.29.23% of the small

firms assessed use accessible knowledge in decision making while 70.76% do not give much attention to the practice. In the medium size firms 20% of the medium size firms in the construction industry in Abuja adopt the use of accessible knowledge in decision making while 80% don't give much priority to the practice. The large firms have 72.22% of the firms carrying out the aforementioned practice while 27.78% do not give much attention to the practice.

4.2.2.4 Providing access to collaborative IT systems

Out of the responses obtained from micro size firms in the construction industry in Abuja 17.64% of the firms provides access to collaborative IT system while 82.35% of the Micro firms do not give much attention to it.65 numbers of responses was obtained from small firms in which 18.46% of the firms provides access to collaborative IT systems while 81.54% don't give much attention to the practice. 27.27% medium size firms assessed provides access to collaborative IT systems while 72.73% of the medium size firms do not provide access to collaborative IT systems.55.56% of the large firms as observed in this study provide access to collaborative IT systems while 44.44% do not give much attention to the practice.

4.2.2.5 Senior management support/ commitment in knowledge creation sharing and use

It was observed in this research that, 17.64% of the Micro size firms in construction industry in Abuja gain senior management support and commitment in Knowledge creation and use. In addition micro size firms observed shows that 82.35% of the firms do not give much attention to the practice. As observed in the small firms 33.85% of the small firms gains senior management support in knowledge creation, sharing and use while 69.15% of

those firms do not give much attention to the practice.45.45% of the medium size firms observed in the research gain senior management support in knowledge creation and use while 54.55% of the firms do not give much attention to the practice.83.33% of the large firms gains senior management support in knowledge creation and use while 16.67% do not give much attention to the practice.

4.2.2.6 Creating suitable work related environment

The above stated practice was adopted by 29.41% of the Micro size firms in construction industry as observed while 70.59% of the firms do not give much attention to the practice. The percentage of Small size firms that create suitable work related environment is 16.92% as observed while 83.07% do not give much attention to the practice.72.72% of the medium size firms create a suitable work related environment while 27.27% do not give much attention to the practice.55.56% of the large firms as observed create suitable work related environment while 44.44% do not give much attention to the practice.

4.2.2.7 Stimulation of continuous learning

The Micro firms as observed shows that 15% of them stimulate continuous learning while 85% of them do not give much attention to stimulating continuous learning. The small firms have 33.84% of them carrying out the practice while 66.15% do not give much attention to the practice.62.50% of the medium size firms practice the stimulation of continuous learning while 37.50% of the medium firms do not give much attention to it. The large firms has 72.22% of them practicing stimulation of continuous learning while 27.78% of do not give much attention to it.

4.2.2.8 Employee training aimed at enhancing employee's involvement in knowledge creation and sharing

As observed, 17.65% of Micro size firms carryout the training of employee which is aimed at enhancing employee's involvement in knowledge sharing while 82.35% do not give much attention to it. As observed in small firms, 27.69% practices the aforementioned practice while 72.31% do not give much attention to the practice. 45.45% of the Medium size firms train employee with the aim of enhancing employee's involvement in knowledge sharing while 54.54% of them do not give much attention to the practice. 72.22% of the large firms assessed carry out the training of employee which is aimed at enhancing employee's involvement in knowledge sharing while 27.78% do not give much attention to it.

4.2.2.9 Generating new knowledge

As observed in this research 11.76% of the Micro firms assessed generates new knowledge while 88.24% of the firms do not give much attention to the practice.88.24% of the Small firms as observed generates new knowledge while 64.62% of the firms do not give much attention to it .The medium size firms has 27.27% which practice the above mentioned practice while 72.73% do not give much attention to it. 55.56% of the large firms generate new knowledge while 44.44% do not give much attention to the practice.

4.2.2.10 Facilitating knowledge growth over culture and incentives

The Micro Firms as observed have 26.32% of firms assessed, facilitating knowledge growth over culture/incentives while 73.68% of the Firms do not give much attention to it. The Medium size Firms has 21.54% of the firms facilitating knowledge advancement through culture/incentives while 78.46% of the Firms do not gives much attention to facilitating

knowledge growth through culture/incentives. 11.11% of the Medium size firms as observed facilitate knowledge growth through culture/incentives while 88.89% of the firms do not give much attention to the practice. 72.22% of the large firms as observed facilitate knowledge growth through culture/incentives while 27.78% of the Firms do not give much attention to it.

4.2.2.11 Knowledge reuse

As observed in this research 17.65% of the Micro firms assessed reuse knowledge from past projects while 82.35% of the firms do not give much attention to the practice.21.54% of the Small firms as observed reuse knowledge while 78.46% of the Firms do not give much attention to the practice.The medium size firm has 54.55% of them that practices the above mentioned practice while 45.45% do not give much attention to the practice. 55.56% of the large firms reuse knowledge while 44.44% do not practice it.

4.2.2.12 Knowledge-friendly culture

As observed in this research 64.71% of the Micro firms assessed develops Knowledge-friendly Culture while 35.29% of the firms do not give much attention to the practice.12.31% of the Small firms as observed develops Knowledge-friendly Culture while 87.69% of the Firms do not give much attention to the practice .The medium size firms has 27.27% of them that practices the above mentioned practice while 72.27% do not. 72.22% of the large firms reuse knowledge while 27.78% do not give much attention to the practice.

4.2.2.13 Encouraging knowledge transfer

The micro firms as observed have 29.41% of the firms that encourages knowledge transfer while 70.59% of the firms do not give much attention to the practice. The medium size firms have 20% of the firms that encourages knowledge transfer while 80% of the Firms do

not encourages knowledge transfer. 45.45% of the Medium size firms as observed encourage knowledge transfer while 54.55% of the firms do not give much attention to the practice. 72.22% of the large firms as observed encourage knowledge transfer while 27.78% of the Firms do not give much attention to the practice.

4.2.2.14 Sharing of best practices

The above stated practice was adopted by 26.32% of the Micro size firms as observed while 73.68% of the firms do not engage in the practice. The percentage of Small size firms that Shares best practices is 12.31% as observed while 87.69% do not give much attention to the practices. 20% of the medium size firms Shares best practices while 80% do not adopt the practice. 55.56% of the large firms as observed Shares best practices while 44.44% do not adopt such practice.

4.2.2.15 Knowledge capturing/re-use

In the study Knowledge capturing/re-use as practiced by Micro firms from responses obtained were 17.64% while 82.35% of the firms under this category do not give much attention to the practice. 12.30% of the Small firms have observed in this research practice Knowledge capturing/re-use while 87.69% of the total responses obtained do not practice knowledge sharing. 27.27% of the Medium size firm practice knowledge sharing while 72.72% do not give much attention to the practiceof Knowledge capturing/re-use. 55.56% of the large firms as observed in this research practice Knowledge capturing/re-use while 44.44% of the total responses acquired under this category of firm do not give much attention to the practice. At the end it was observed that the large firm practice knowledge sharing more than other category of firms observed by comparing the percentage of responses obtained from each category of firms.

4.2.2.16 Transferring of existing knowledge into other parts of the organisation

As observed in this research 35.29% of the Micro firms assessed transfers existing knowledge into other parts of the organisation while 64.70% of the firms do not give much attention to the practice.24.62% of the Small firms as observed transfer existing knowledge into other parts of the organisation while 75.38% of the Firms do not give much attention to the practice.The medium size firm has 45.45% of them that practices the above mentioned practice while 54.55% do not. 55.56% of the large firms transfer existing knowledge into other parts of the organisation while 44.44% do not practice it.

4.2.2.17 Accessing valuable knowledge from outside sources

As observed in this research 47.06% of the Micro firms assessed access valuable knowledge from outside sources while 52.94% of the firms do not give much attention to the practice. 46.15% of the Small firms as observed access valuable knowledge from outside sources while 53.85% of the Firms do not give much attention to the practice .The medium size firms have 27.27% of them that practices the above mentioned practice while 72.73% do not. 72.22% of the large firms access valuable knowledge from outside sources while 27.78% do not give much attention to the practice.

4.2.2.18 Teamwork encouragement

The micro size firms that encourage teamwork constitute 35.29% of the firms' assessed while 64.71% of the observed firms do not give much attention to teamwork encouragement. The Small firms assessed have 24.62% encouraging teamwork and 75.38 % don't give much attention to encouraging teamwork. It was also observed that 45.45% of the medium firms encourage teamwork while 54.55% of the firms under this category don't give much attention to encouragement of teamwork. The large firms comprising up to over

300 employees encouraging teamwork were 55.56% while 44.44% of the total responses acquired from large don't give much attention to encouragement of project teamwork.

4.2.2.19 Interaction and socialization

As observed in this research 47.05% of the Micro firms assessed stimulate employee interaction and socialization while 52.94% of the firms do not give much attention to that. 46.15% of the Small firms as observed stimulate employee interaction and socialization while 53.85% of the firms do not give much attention to that.The medium size firms have 27.27% of them that, practices the above mentioned practice while 72.73% do not give much attention to that. 72.22% of the large firms stimulate employee Interaction and socialization while 27.77% do not give much attention to the practice.

4.2.2.20 Innovation and knowledge creation

As observed in this research 58.82% of the Micro firms assessed,stimulate innovation and knowledge creation in the organisation while 41.18% of the firms do not give much attention to that. 55.38% of the Small firms as observed stimulate innovation and knowledge creation in the organisation while 44.62% of the firms do not give much attention to that. The medium size firms has 90% of them that practices the above mentioned practice while 10% do not give much attention to that. 94.74% of the large firms stimulate innovation and knowledge creation in the organisation while 5.26% do not give much attention to the practice.

4.2.2.21 Motivating workers to develop, share and use knowledge

As observed in this research 47.05% of the Micro firms assessed motivate workers to develop, share and use knowledge while 52.95% of the firms do not give much attention to that. 24.62% of the Small firms as observed motivate workers to develop,share and use knowledge while 75.38% of the firms do not give much attention to that.The medium size firms has 88.89% of them that practice the above mentioned practice while 11.11% do not give much attention to that. 90% of the large firms motivate workers to develop, share and use knowledge while 10% do not give much attention to the practice.

4.2.2.22 Benchmarking techniques to improve its employees' competences

As observed in this research 17.64% of the Micro firms assessed,benchmarks techniques to improve its employees' competences while 82.35% of the firms do not give much attention to that.15.38% of the Small firms as observed benchmarks techniques to improve its employees' competences while 84.62% of the firms do not give much attention to that. The medium size firms has 27.27% of them that practices the above mentioned practice while 72.73% do not give much attention to that. 55.56% of the large firms benchmarks techniques to improve its employees' competences while 44.44% do not give much attention to the practice.

4.2.2.23 Building the right know-how and expertise

As observed in this research 47.05% of the Micro firms assessed build the right know-how and expertise while 52.95% of the firms do not give much attention to that. Furthermore 29.23% of the Small firms observed build the right know-how and expertise while 70.76% of the firms do not give much attention to the practice.The medium size firms has 45.45% of them that practices the above mentioned practice while 54.54% do not give much

attention to that.66.67% of the Large firms build the right know-how and expertise while 33.33% do not give much attention to the practice.

4.3 Assessment of factors affecting the Capture and Reuse of project knowledge in the construction industry

Table 4.5 and 4.6 shows the Relative importance index (RII) of the construction professional's perception on factors affecting the capturing and reuse of project Knowledge respectively.

4.3.1 Professionals' assessment of factors affecting the capture of project knowledge

Table 4.5 shows RII of the respondents' perception on factors affecting the capture of project knowledge with RII between 0.66 and 0.78 showing that, virtually all the factors affecting the capture of project knowledge is important to construction firms in Abuja. Various professionals' views on the factors affecting the capture of project knowledge were observed. However, the Architects (SD = 0.885, RII = 0.90), Engineers (SD = 0.539, RII = 0.77) and Estate Surveyor's (SD = 0.548, RII = 0.72) as observed ranked "Organisational culture" as the most significant factor affecting the capture of project knowledge. The Builders ranked "Standard platform to capture and share knowledge" (SD = 0.795, RII = 0.85) and the Quantity surveyor's ranked "Personnel changing companies or industry" (SD = 1.100, RII = 0.79) as the most important factors affecting construction project knowledge in the construction industry. At the overall assessments it was observed that, "Standard platform to capture and share knowledge" (RII = 0.78) was ranked first and considered to be the most important factor affecting the capture of project knowledge.

It is inferred from the result presented that RII between 0.67 and 0.75 shows that, the KM practice attribute is considered to be significant according to Vanduhe (2012). In addition, RII of above 0.76 above recorded for some of the results shows that, the KM practice attributes are very significant. As observed by professionals' standard platform to capture and share knowledge is considered an important factor affecting the capturing of project knowledge in Nigerian construction industry. This finding conforms to Oke*et al*. (2013) views that, one of the problems of adopting knowledge management in Nigeria construction industry is the difficulty in capturing of relevant knowledge. Sodiya*et al.* (2006) also highlighted in a study on KM that, best practices are not being captured and utilize effectively due to lack of practice of Knowledge management. This makes it necessary to give attention to those factors highlighted in Table 4.5.

Table 4.5: Assessment of factors affecting the capture of project knowledge

S/N	Factors affecting the capture of project knowledge	Construction professionals																
		Architect's			Builder's			Quantity Surveyor's			Engineer's			Estate Surveyor's			Over all assessment	
		SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	RII	RANK
1.	Personnel changing companies or industry	1.250	0.71	4th	0.938	0.73	4th	1.100	0.79	1st	1.237	0.68	5th	0.548	0.52	5th	0.71	3rd
2.	Standard platform to capture and share Knowledge	0.721	0.89	2nd	0.795	0.85	1st	0.704	0.75	2nd	1.045	0.67	6th	1.643	0.44	6th	0.78	1st
3.	Employee retiring	0.797	0.58	7th	1.051	0.67	7th	1.345	0.53	7th	0.990	0.77	3rd	0.548	0.68	2nd	0.66	7th
4.	Employees transfer	1.083	0.61	6th	0.645	0.71	5th	0.799	0.65	4th	0.743	0.77	2nd	0.548	0.28	7th	0.68	6th
5.	Viewing knowledge as competitive edge	0.509	0.69	5th	0.945	0.77	2nd	0.640	0.63	5th	1.078	0.67	7th	0.548	0.68	2nd	0.70	4th
6.	Outsourcing	1.167	0.73	3rd	0.948	0.68	6th	0.915	0.63	6th	0.660	0.74	4th	0.548	0.68	2nd	0.70	5th
7.	Organisational culture	0.885	0.90	1st	0.815	0.73	3rd	0.976	0.67	3rd	0.539	0.77	1st	0.548	0.72	1st	0.77	2nd

Source: Field Survey (2015)

Furthermore, in figure 1 of appendix II, percentage of responses from construction professionals shows that, 42.3% of the respondents out of the total respondents, indicate that, they agree "personnel changing companies' affects project knowledge capture", 24.3% remains neutral, 18% strongly agree, 8.1% strongly disagree and 7.2% disagrees. The percentage response for "standard platform to capture/share" shows 39.6% of the respondent agreeing with the aforementioned factor, 31.5% strongly agree, 21.6% remains Neutral, 5.8% strongly disagree and 1.8% disagree. Subsequently response on the factors shows that "Employee retiring" was agreeing with by 36.9%, 26.1% remains neutral, 19.8% disagree and 5.4% strongly agree. "Employees transfer" was agree with by 42.3%, 34.2% remains neutral, 10.8% disagree, 8.1% strongly agree and 4.5% strongly disagree. "Viewing knowledge as competitive edge" was agree with by 42.3% as factor affecting the capture of knowledge, 34.2% remains neutral and 10.8% disagrees. "Outsourcing" was agree with by 40.5% as factor affecting the capture of project knowledge, 33.3% remains neutral, 12.6% strongly agree, 11.7% disagree and 1.8% strongly disagree. "Organisational culture" was agree with by 51.4% as factor affecting the capture of project Knowledge, 20.7% strongly agree, 18.9% remains neutral and 9% disagree.

4.3.2 Professionals' assessment of factors affecting the reuse project knowledge

Table 4.6 shows the RII of various professionals' perceptions. The respondents' perceptions on the factors affecting the reuse of project knowledge were shown with RII between 0.57 and 0.90 showing that some factors are considered to be between fairly significant to very significant.

Table4.6: Assessment factors affecting the re-use of project knowledge

	Factors affecting the re-use of project knowledge	Construction professionals															
		Architect's			Builder's			Quantity Surveyor's			Engineer's			Estate Surveyor's			Over all assessment	
		SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	SD	RII	RANK	RII	RANK
1.	Personnel changing companies or industry	0.900	0.78	4th	0.998	0.75	4th	0.990	0.71	3rd	1.214	0.70	3rd	0.000	0.60	3rd	0.73	4th
2.	Team being separated after completion of project	0.511	0.90	1st	0.751	0.75	3rd	0.961	0.75	2nd	1.270	0.71	2nd	0.548	0.92	1st	0.77	1st
3.	Motivation	0.963	0.87	2nd	0.563	0.76	1st	0.704	0.75	1st	1.320	0.64	7th	1.095	0.84	2nd	0.75	2nd
4.	Organisational Culture	0.947	0.83	3rd	0.724	0.75	2nd	0.915	0.63	5th	0.772	0.78	1st	0.000	0.60	3rd	0.75	3rd
5.	Self confidence	1.103	0.70	5th	1.083	0.65	6th	1.060	0.57	6th	1.168	0.66	5th	0.000	0.60	3rd	0.65	5th
6.	Employee retiring	1.062	0.56	7th	0.822	0.61	7th	1.100	0.55	7th	0.751	0.66	4th	0.548	0.48	6th	0.59	7th
7.	Death	1.341	0.57	6th	1.081	0.68	5th	1.356	0.71	4th	1.048	0.64	6th	0.548	0.48	6th	0.64	6th

Source: Field Survey (2015)

In addition Table 4.6 shows the Standard Deviation (SD) of various professional views on the factors affecting the reuse of project knowledge. The Architects (SD = 0.511, RII = 0.90) and Estate Surveyor's (SD = 0.548, RII = 0.92) as observed ranked "Team separation after completion of project" as the most important factor affecting the reuse of project knowledge in the Nigerian construction industry. The Builders (SD = 0.563, RII = 0.76) and Quantity Surveyors (SD = 0.704, RII = 0.75) ranked "Motivation" as the most important factor affecting reuse of project knowledge. The Engineers ranked "Organisational culture" (SD = 0.772, RII = 0.78) as the most important factor affecting reuse of project knowledge. In the overall assessment "Team separation after completion of project" (SD = 0.77) was ranked the most important factor by all professionals.

It can be inferred from the result presented that "Team separation after completion of project" is considered to be the most important factor affecting reuse of project knowledge as project team disperse after a project have been terminated leaving individual to go away with knowledge acquired during the developmental stages of project such as the initiation stage, planning and design stage, construction and execution stage.

Furthermore, figure 2 under appendix II shows that 39.6% of the respondents indicate that they agree that "Personnel changing companies" affects project knowledge reuse, 27% remains neutral, 20.7% strongly agree, 9% disagrees and 3.6% strongly disagree. The percentage responses for "Team being separated after completion of project" shows 54.1% of the respondent agreeing with the aforementioned factor, 22.5% strongly agree, 12.6% remains neutral, 8.1 % disagree and 2.7% strongly disagree. "Motivation" was agree with by 48.6%, 26.1% strongly agree, 20.7 % remains neutral, 5.4% strongly disagree and 3.6% disagree. "Organisational culture" was agreed with by 47.7%, 25.2% remains neutral,

18.0% strongly agree and 9% disagree. “Self-confidence” was agree with by 43.2% as factor affecting the reuse of project knowledge, 27.9% remains neutral, 11.7% disagrees, 9.9% strongly disagree and 7.2% strongly agree. “Employee retiring” was agree with by 27% as factor affecting the Reuse of project Knowledge , 45% remains neutral, 18.9% disagree, 7.2% strongly disagree while 1.8% strongly agree. “Death” was agree with by 36.9% as factor affecting the reuse of project knowledge , 21.6% disagree, 20.7% remains neutral , 11.7% strongly agree and 9% strongly disagree. However RII of the percentages of responses gave the ranking in table 4.6. “Team separation after completion of project” was most agreed factor affecting the reuse of project knowledge which conforms with sodiya*et al*.(2006) view on a study carried out on knowledge management that tacit knowledge are lost when employee goes away from an organisation.

4.4 Examining Effect of Knowledge Management on Project Performance

4.4.1 Professional’s perceived effect of knowledge management on project performance

The table 4.7, 4.8 and 4.9 shows the mean of responses of construction professionals on the perceived effect of knowledge management on construction project performance. The standard deviation (SD) was also included in the tables to help give a better ranking where the RII of statements/items used in describing KM practice attributes are the same.

Table 4.7: Professionals' assessment of Knowledge management practice attributes on project cost

S/N	Knowledge management practice attributes	Construction professionals															
		Architect's			Builder's			Project Cost Quantity Surveyor's			Engineer's			Estate Surveyor's			Over all	
		MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	RANK
1.	Accessing relevant information pertaining to task	3.83	0.816	10th	3.53	0.979	16th	3.67	0.488	9th	3.90	1.081	13th	3.20	1.643	13th	3.69	16th
2.	Knowledge sharing	3.79	0.658	3th	3.39	1.079	9th	3.00	0.926	2nd	3.79	0.819	8th	3.20	1.643	3rd	3.52	20th
3.	Using accessible knowledge in decision making	3.58	1.018	21st	3.39	0.718	18th	3.20	1.373	21st	3.93	1.033	11th	2.00	0.000	22nd	3.49	21st
4.	Providing access to collaborative IT systems	3.75	0.944	16th	3.24	0.913	22nd	3.33	1.175	18th	3.59	0.867	22nd	1.60	0.548	23rd	3.38	23rd
5.	Senior management support / commitment in knowledge creation sharing and use	4.21	0.721	2nd	3.63	1.172	11th	3.67	0.900	10th	4.45	0.910	5th	3.20	1.095	15th	3.95	3rd
6.	Creating Suitable work related environment	3.71	0.690	17th	3.74	0.860	5th	3.20	0.941	20th	4.28	1.131	6th	2.40	0.548	20th	3.74	9th
7.	Stimulation of Continuous Learning	3.42	0.974	23rd	3.63	1.172	11th	3.60	1.056	12th	4.19	0.736	1st	4.60	0.548	1st	3.76	10th
8.	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	3.58	0.717	20th	3.74	0.860	5th	3.27	0.884	19th	3.86	0.915	16th	3.60	0.548	3rd	3.67	18th
9.	Generating New Knowledge	3.79	0.932	14th	3.68	0.809	8th	3.47	0.516	16th	3.76	1.185	19th	3.20	1.095	15th	3.68	13th
10.	Facilitating Knowledge growth through culture and incentives	3.67	0.816	18th	3.71	0.654	7th	3.00	0.845	23rd	3.90	1.319	23rd	3.20	1.095	15th	3.63	19th
11.	Knowledge Reuse	3.96	0.908	7th	3.55	0.645	1st	3.53	0.743	13th	3.86	1.217	14th	3.60	0.548	3rd	3.72	14th
12.	Knowledge-friendly Culture	3.67	0.816	18th	3.79	0.875	3rd	3.87	0.352	4th	3.62	1.237	23rd	3.60	0.548	3rd	3.72	15th
13.	Encouraging knowledge transfer	3.83	0.816	10th	3.66	0.966	10th	3.47	0.834	17th	3.72	1.306	20th	3.60	0.548	3rd	3.68	17th
14.	Sharing of best practices	3.83	0.637	8th	3.82	0.801	2nd	3.60	0.507	11th	4.07	1.334	9th	2.40	0.548	20th	3.79	6th
15.	Knowledge capturing/re-use	3.83	0.816	10th	3.68	0.809	8th	4.13	0.352	2nd	4.52	0.911	3rd	3.00	0.000	18th	3.96	2nd
16.	Transferring of existing knowledge into other parts of the organization	4.21	0.721	2nd	3.58	0.858	13th	3.87	0.743	5th	3.97	0.981	10th	3.00	0.000	18th	3.83	4th
17.	Accessing valuable knowledge from outside sources	4.08	0.830	5th	3.47	0.797	17th	3.87	0.743	5th	3.66	1.078	21st	3.60	0.548	3rd	3.71	11th
18.	Team encouragement to share knowledge	3.96	0.751	6th	3.58	0.948	15th	3.87	0.834	7th	3.86	1.217	17th	3.60	0.548	3rd	3.77	8th
19.	Interaction and socialization	3.54	0.977	22nd	2.89	0.953	23rd	4.27	0.799	1st	3.90	1.319	15th	3.00	0.000	18th	3.49	22nd
20.	Innovation and knowledge creation	3.83	0.637	8th	3.76	0.634	4th	3.80	0.414	8th	4.52	0.911	3rd	3.60	0.548	3rd	3.97	1st
21.	Motivating workers to develop, share and use knowledge	4.25	0.794	1st	3.37	0.786	20th	3.53	0.990	15th	4.14	0.639	7th	3.60	0.548	3rd	3.79	5th
22.	Benchmarking techniques to improve its employees' competences	4.21	0.721	2nd	3.34	0.815	21st	3.53	0.743	14th	4.17	1.002	8th	4.20	1.095	2nd	3.81	7th
23.	Building the right know-how and expertise	3.79	0.932	14th	3.58	0.858	13th	4.13	0.743	3rd	4.62	0.622	2nd	3.60	0.548	3rd	3.71	12th

Source: Field Survey (2015)

The findings on the perceived effect of KM on project cost on table 4.7 shows that, “Motivating workers to develop, share and use knowledge” (Mean = 4.25, SD = 0.794) was ranked first by the Architects while the Builders ranked “Knowledge Reuse” (Mean = 3.55, SD = 0.645) first. Then the, Quantity Surveyors ranked “Interaction and socialization” (Mean = 4.27, SD = 0.799) as the KM practice attribute perceived to have most effect.Lastly, Engineers (Mean = 4.19, SD = 0.736) and Estate Surveyors ranked (Mean = 4.60, SD = 0.548) ranked “stimulation of continuous learning” as first. Then in overall, “Innovation and knowledge creation” (Mean = 3.97)was ranked first by the professional as the KM practice attribute that has the most effect on performance.

Therefore, it is inferred from the result presented that, the most important knowledge management practice attribute found to have the most effect on construction cost performance is innovation and knowledge creation. Innovative ideas and modernisation of construction process can enhance project delivery by minimising construction rework/errors.

Table 4.8: Professionals' assessment of Knowledge management practice attributes on project quality

S/N	Knowledge management practice attributes	Construction professionals															
		Architect's			Builder's			Project Quality Quantity Surveyor's			Engineer's			Estate Surveyor's			Over all	
		MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	RANK
1.	Accessing relevant information pertaining to task	3.79	0.658	10th	3.37	1.076	17th	3.73	0.458	8th	3.17	1.311	21st	2.80	1.095	22nd	3.43	19th
2.	Knowledge sharing	3.79	0.833	3th	3.37	1.172	8th	3.00	0.926	22nd	3.28	1.579	8th	4.40	0.548	2nd	3.43	20th
3.	Using accessible knowledge in decision making	3.96	1.042	21st	3.32	0.702	22nd	2.80	1.373	23rd	3.48	0.911	23rd	2.00	0.000	10th	3.37	22nd
4.	Providing access to collaborative IT systems	3.54	0.977	16th	3.29	0.732	19th	3.13	0.640	21st	3.41	1.240	14th	2.00	0.000	23rd	3.30	23rd
5.	Senior management support / commitment in knowledge creation sharing and use	3.58	1.248	2nd	3.66	0.847	6th	3.87	0.834	5th	3.72	1.162	3rd	4.40	0.548	2nd	3.72	4th
6.	Creating Suitable work related environment	3.58	0.881	17th	3.79	1.069	3rd	3.80	0.676	6th	3.48	1.353	10th	3.20	1.643	18th	3.64	9th
7.	Stimulation of Continuous Learning	3.58	1.283	23rd	3.82	0.982	2nd	3.93	0.594	2nd	3.59	1.086	7th	5.00	0.000	1st	3.77	2nd
8.	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	3.54	1.141	20th	3.97	0.854	1st	3.67	0.900	12th	3.55	1.270	8th	3.20	1.095	19th	3.69	7th
9.	Generating New Knowledge	3.83	1.129	14th	3.26	0.921	21st	3.67	0.488	10th	3.03	1.426	22nd	3.80	1.095	15th	3.41	21st
10.	Facilitating Knowledge growth through culture and incentives	3.83	1.007	18th	3.42	1.200	23rd	3.27	0.884	20th	3.52	1.214	9th	4.20	1.095	15th	3.55	17th
11.	Knowledge Reuse	4.13	1.035	7th	3.76	1.195	5th	3.33	0.724	19th	3.41	1.524	16th	4.20	1.095	15th	3.71	8th
12.	Knowledge-friendly Culture	4.00	0.978	18th	3.53	1.006	3rd	3.53	0.516	15th	3.52	1.455	11th	3.00	0.000	20th	3.60	12th
13.	Encouraging knowledge transfer	3.79	1.318	10th	3.47	1.084	15th	3.67	0.488	10th	3.45	1.325	13th	4.20	1.095	4th	3.59	13th
14.	Sharing of best practices	3.88	0.900	8th	3.61	1.001	9th	3.60	0.507	13th	3.79	1.424	2nd	3.60	0.548	12th	3.71	5th
15.	Knowledge capturing/re-use	3.88	0.900	10th	3.74	0.828	4th	3.73	0.961	9th	3.66	1.045	5th	4.20	1.095	18th	3.77	1st
16.	Transferring of existing knowledge into other parts of the organization	3.79	0.977	2nd	3.55	0.724	11th	3.47	0.516	18th	3.34	1.010	17th	3.60	0.548	12th	3.54	14th
17.	Accessing valuable knowledge from outside sources	3.83	0.816	5th	3.47	0.725	13th	3.60	0.507	13th	3.17	1.104	20th	3.60	0.548	14th	3.50	18th
18.	Team encouragement to share knowledge	4.04	0.690	6th	3.45	1.108	14th	3.93	0.594	2nd	3.69	1.391	4th	4.20	1.095	4th	3.74	3rd
19.	Interaction and socialization	3.50	0.978	22nd	3.26	0.860	20th	3.80	0.676	6th	3.97	0.981	1st	3.00	0.000	20th	3.56	15th
20.	Innovation and knowledge creation	3.83	0.637	8th	3.50	1.109	12th	3.53	0.990	16th	3.76	1.327	6th	3.60	0.548	12th	3.58	11th
21.	Motivating workers to develop ,share and use knowledge	3.79	0.658	1st	3.37	0.819	16th	3.93	0.594	2nd	3.52	1.526	12th	4.20	1.095	4th	3.61	10th
22.	Benchmarking techniques to improve its employees' competences	3.79	0.658	2nd	3.61	1.001	9th	3.53	0.990	16th	3.24	1.354	19th	4.20	1.095	4th	3.57	16th
23.	Building the right know-how and expertise	3.88	0.900	14th	3.61	0.916	8th	4.13	0.352	1st	3.41	1.452	15th	4.20	1.095	4th	3.71	6th

Source: Field Survey (2015)

The findings on the perceived effect of KM on project quality on table 4.8 shows that, “Motivating workers to develop, share and use knowledge” (Mean = 3.79, SD = 0.658) was ranked first by the Architects. The Builders ranked “Employee training aimed at enhancing employee's involvement in knowledge creation and sharing” (Mean = 3.97, SD = 0.854) first as well. Then the, Quantity Surveyors ranked “Building the right know-how and expertise” (Mean = 4.13, SD = 0.352) as the KM practice attribute perceived to have most effect.Lastly, Engineers ranked“Interaction and socialization” (Mean = 3.97, SD = 0.981) and Estate surveyors ranked “Stimulation of Continuous Learning”(Mean = 5.00) as first. Then in the overall assessment, “Knowledge capturing/re-use” (Mean = 3.77)was ranked first by the professionals on a collective view as the KM practice attribute that has the most effect on performance.

Therefore, it is inferred from the result presented that, the most important knowledge management practice attribute found to have the most effect on construction quality performance is the capturing and reuse of knowledge. The consistent reuse of particular skills over and over for a period of time will allow such skills to be mastered, which in turn can enhance the quality of project delivered at the end of each construction project.

Table 4.9: Professionals' assessment of Knowledge management practice attributes on project time

S/N	Knowledge management practice attributes	Construction professionals															
		Project Time															
		Architect's			Builder's			Quantity Surveyor's			Engineer's			Estate Surveyor's			Over all	
		MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	RANK
1.	Accessing relevant information pertaining to task	3.67	0.730	16th	4.00	0.986	8th	3.20	0.941	21st	**4.48**	**0.785**	**1st**	4.00	0.000	13th	3.95	**10th**
2.	Knowledge sharing	4.52	0.550	2th	3.66	0.994	0th	3.53	1.187	14th	3.69	1.039	8th	4.00	0.000	3rd	3.73	**17th**
3.	Using accessible knowledge in decision making	4.24	0.859	9th	3.84	0.594	12th	3.47	1.246	16th	4.52	0.911	2nd	3.60	0.548	15th	3.93	**9th**
4.	Providing access to collaborative IT systems	4.38	0.868	6th	3.79	0.811	16th	3.33	0.724	18th	4.17	0.928	9th	4.20	1.095	3rd	3.86	**14th**
5.	Senior management support / commitment in knowledge creation sharing and use	4.52	0.908	18th	4.39	0.718	2nd	3.87	1.060	8th	4.24	1.023	8th	4.60	0.548	2nd	4.20	**2nd**
6.	Creating suitable work related environment	4.67	0.830	20th	**4.45**	**0.828**	**1st**	4.00	0.845	3rd	4.45	0.948	3rd	2.80	1.095	23rd	4.23	**1st**
7.	Stimulation of continuous learning	4.24	0.908	23rd	4.11	0.831	6th	**4.33**	**0.488**	**1st**	4.10	1.235	12th	**5.00**	**0.000**	**1st**	4.09	**4th**
8.	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	4.10	0.717	22nd	4.18	0.766	4th	4.07	0.961	2nd	4.00	1.035	14th	3.20	1.095	21st	3.95	**8th**
9.	Generating New Knowledge	3.90	0.830	2nd	3.71	0.867	18th	3.67	1.047	11th	3.90	1.319	16th	4.20	1.095	3rd	3.71	**22nd**
10.	Facilitating Knowledge growth through culture and incentives	3.90	0.974	10th	3.95	0.733	9th	3.27	0.884	20th	3.41	1.296	22nd	3.60	0.548	15th	3.59	**23rd**
11.	Knowledge Reuse	4.81	0.721	3rd	3.87	1.070	14th	3.33	0.724	18th	3.45	1.502	21st	4.20	1.095	3rd	3.77	**19th**
12.	Knowledge-friendly culture	4.48	1.018	11th	3.92	0.749	11th	3.13	0.743	23rd	3.48	1.243	20th	3.60	0.548	15th	3.68	**21th**
13.	Encouraging knowledge transfer	4.67	0.654	**1st**	3.66	0.781	19th	3.47	0.516	15th	3.41	1.376	23rd	4.20	1.095	3rd	3.68	**20th**
14.	Sharing of best practices	4.52	0.751	7th	4.03	0.677	7th	3.40	0.828	17th	3.97	1.451	15th	3.60	0.548	15th	3.89	**13th**
15.	Knowledge capturing/re-use	4.81	0.721	3rd	4.18	0.692	3rd	3.93	0.594	4th	3.62	1.449	19th	4.20	1.095	3rd	4.01	**7th**
16.	Transferring of existing knowledge into other parts of the organization	4.52	0.751	5th	3.87	0.844	13th	3.87	0.743	7th	4.17	0.966	10th	4.20	1.095	3rd	3.98	**5th**
17.	Accessing valuable knowledge from outside sources	4.67	0.654	19th	3.55	0.860	22nd	3.80	0.414	9th	3.79	1.013	17th	3.60	0.548	15th	3.77	**15th**
18.	Team encouragement to share knowledge	4.67	0.830	20th	4.18	0.896	5th	3.93	0.884	5th	4.17	0.966	10th	4.20	1.095	3rd	4.13	**3rd**
19.	Interaction and socialization	4.19	0.816	8th	3.71	0.768	17th	3.20	1.320	22nd	4.41	1.119	5th	3.00	0.000	22nd	3.78	**16th**
20.	Innovation and knowledge creation	4.10	0.881	13th	3.82	0.609	15th	3.80	0.775	10th	4.31	0.806	6th	4.20	1.095	3rd	3.91	**11th**
21.	Motivating workers to develop ,share and use knowledge	4.52	0.751	15th	3.63	1.051	21st	3.53	0.990	12th	4.38	0.903	4th	4.20	1.095	3rd	3.91	**12th**
22.	Benchmarking techniques to improve its employees' competences	4.38	0.816	17th	3.47	1.109	23rd	3.53	0.990	12th	4.03	0.865	13th	4.20	1.095	3rd	3.74	**18th**
23.	Building the right know-how and expertise	4.33	0.932	14th	3.95	0.985	10th	3.93	0.884	5th	4.31	0.891	7th	3.60	0.548	15th	3.99	**6th**

Source: Field Survey (2015)

The findings on the perceived effect of KM on project time on table 4.9 shows that, “Encouraging knowledge transfer” (Mean = 4.67, SD = 0.654) was ranked first by the Architects. The Builders ranked “Creating Suitable work related environment” (Mean = 4.45, SD = 0.828) first. Then the, Quantity surveyors ranked “Stimulation of Continuous Learning” (Mean = 4.33, SD = 0.488) as the KM practice attribute perceived to have most effect.Lastly, Engineers ranked“Accessing relevant information pertaining to task” (Mean = 4.48, SD = 0.785) and Estate surveyors ranked “Stimulation of continuous learning”(Mean = 5.00) as first. Then in the overall assessment, “Creating suitable work related environment” (Mean = 4.23)was ranked first by the professionals as the KM practice attribute that has the most effect on performance.

Therefore, it is inferred from the result presented that, the most important knowledge management practice attribute found to have the most effect on construction time performance is the creating of suitable work related environment for construction workers. Fashioning of a work environment appropriate for carrying out daily task can enhance the speed in which project is being delivered in order to meet up with client satisfaction.

Table 4.10: Professionals' assessment of Knowledge management practice attributes on construction project performance

S/N	Knowledge management practice attributes	PROJECT COST			PROJECT QUALITY			PROJECT TIME			PERFORMANCE OVER ALL	
		MEAN	SD	RANK	MEAN	SD	RANK	MEAN	SD	RANK	MEAN	RANK
1.	Accessing relevant information pertaining to task	3.69	0.961	16th	3.43	1.032	19th	3.95	0.941	10th	3.69	15th
2.	Knowledge sharing	3.52	0.971	20th	3.43	1.211	20th	3.73	0.934	17th	3.56	22nd
3.	Using accessible knowledge in decision making	3.49	1.035	21st	3.37	1.026	22nd	3.93	0.912	9th	3.60	19th
4.	Providing access to collaborative IT systems	3.38	1.019	23rd	3.30	0.959	23rd	3.86	0.883	14th	3.51	23rd
5.	Senior management support / commitment in knowledge creation sharing and use	3.95	1.039	3rd	3.72	1.020	4th	4.20	0.903	2nd	3.96	1st
6.	Creating Suitable work related environment	3.74	0.997	9th	3.64	1.094	9th	4.23	0.934	1st	3.87	4th
7.	Stimulation of continuous learning	3.76	1.035	10th	3.77	1.050	2nd	4.09	0.949	4th	3.87	4th
8.	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	3.67	0.846	18th	3.69	1.060	7th	3.95	0.903	8th	3.77	10th
9.	Generating new knowledge	3.68	0.926	13th	3.41	1.115	21st	3.71	1.030	22nd	3.60	19th
10.	Facilitating Knowledge growth through culture and incentives	3.63	0.972	19th	3.55	1.126	17th	3.59	0.995	23rd	3.59	21st
11.	Knowledge Reuse	3.72	0.896	14th	3.71	1.224	8th	3.77	1.134	19th	3.73	12th
12.	Knowledge-friendly Culture	3.72	0.906	15th	3.60	1.081	12th	3.68	0.981	21th	3.66	16th
13.	Encouraging knowledge transfer	3.68	1.000	17th	3.59	1.147	13th	3.68	0.963	20th	3.72	13th
14.	Sharing of best practices	3.79	0.955	6th	3.71	1.039	5th	3.89	0.976	13th	3.80	7th
15.	Knowledge capturing/re-use	3.96	0.863	2nd	3.77	0.924	1st	4.01	0.977	7th	3.91	2nd
16.	Transferring of existing knowledge into other parts of the organization	3.83	0.873	4th	3.54	0.840	14th	3.98	0.853	5th	3.78	9th
17.	Accessing valuable knowledge from outside sources	3.71	0.888	11th	3.50	0.851	18th	3.77	0.820	15th	3.66	16th
18.	Team encouragement to share knowledge	3.77	0.960	8th	3.74	1.076	3rd	4.13	0.896	3rd	3.88	3rd
19.	Interaction and socialization	3.49	1.135	22nd	3.56	0.921	15th	3.78	1.030	16th	3.61	18th
20.	Innovation and knowledge creation	3.97	0.756	1st	3.58	1.050	11th	3.91	0.804	11th	3.82	6th
21.	Motivating workers to develop ,share and use knowledge	3.79	0.854	5th	3.61	1.028	10th	3.91	0.987	12th	3.77	10th
22.	Benchmarking techniques to improve its employees' competences	3.81	0.929	7th	3.57	1.058	16th	3.74	0.988	18th	3.71	14th
23.	Building the right know-how and expertise	3.71	0.889	12th	3.71	1.056	6th	3.99	0.929	6th	3.80	7th

Source: Field Survey (2015)

The table 4.10 shows the mean and standard deviation (SD) of responses of construction professionals on the perceived effect of knowledge management on construction project performance. The standard deviation (SD) was used in cases where two or more items had equal mean values. The item having higher SD is ranked lower than the one with lower SD. The findings on the perceived effect of KM on project cost shows that, Innovation and knowledge creation (Mean = 3.97, SD = 0.756) and Providing access to collaborative IT systems (Mean = 3.38, SD = 1.019) was ranked first and the slightest generally by the professionals as the KM practice attribute that has the most effect on performance. The findings on the perceived effect of KM on project quality shows that, Knowledge capturing/re-use(Mean = 3.77, SD = 0.924) and providing access to collaborative IT systems (Mean = 3.30, SD = 0.959) was ranked first and the slightest generally by the professionals as the KM practice attribute that has the most effect on performance. The findings on the perceived effect of KM on project time shows that, Creating Suitable work related environment (Mean = 4.23 , SD = 0.934) and Facilitating Knowledge growth through culture and incentives (Mean = 3.59, SD = 0.995) was ranked first and the slightest generally by the professionals as the KM practice attribute that has the most effect on performance.

In the overall assessment, senior management support / commitment in knowledge creation sharing and use (Mean = 3.96) was ranked first while providing access to collaborative IT systems (Mean = 3.51) was ranked the least. It can be inferred from the result observed that senior management support will go a very long way in enhancing the practice of KM in the construction industry which will in turn enhance the way project is been delivered in the industry.

4.4.2 Association of knowledge management and performance

In order to establish the knowledge management practice attributes that has association with project performance, a chi-square test was carried out to test the association between knowledge management practices as identified in the study and project performance. According to Blaikeand Lomax cited in Meng (2013) chi-square test is used to determinate the association between two variables. Due to the stated reason chi-square test was used to test the association between the identified knowledge management practices with project performance in terms of cost, quality and time. The result of their association is shown in the table 4.11 presented. Additionally, the values of significant level obtained for each performance indicators are shown for some of the items/statements indicating KM attributes under appendix III which are generated with chi-square using frequency of responses from construction professionals shown on tables 1, 2 and 3 in appendix II for project cost, quality and time.

Table 4.11: Knowledge management practices association with project performance

S/N	Knowledge Management Practice Attributes	Project Time		Project Quality		Project Cost	
		Significant Level	Rank	Significant Level	Rank	Significant Level	Rank
1.	Accessing relevant information pertaining to task	0.026	4th	0.961	22nd	0.030	3rd
2.	Knowledge sharing	0.574	21st	0.781	17th	0.531	15th
3.	Using accessible knowledge in decision making	0.018	2nd	0.812	18th	0.005	1st
4.	Providing access to collaborative IT systems	0.150	12th	0.063	5th	0.086	6th
5.	Senior management support / commitment in knowledge creation sharing and use	0.419	17th	0.604	13th	0.223	10th
6.	Creating Suitable work related environment	0.451	20th	0.770	16th	0.393	14th
7.	Stimulation Of Continuous Learning	0.025	3rd	0.002	2nd	0.283	12th
8.	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	0.831	22nd	0.558	12th	0.360	13th
9.	Generating New Knowledge	0.063	9th	0.486	11th	0.123	9th
10.	Facilitating Knowledge growth through culture and incentives	0.410	16th	0.913	21st	0.825	19th
11.	Knowledge Reuse	0.041	7th	0.853	20th	0.102	8th
12.	Knowledge-friendly Culture	0.032	5th	0.721	15th	0.074	4th
13.	Encouraging knowledge transfer	0.090	10th	0.649	14th	0.835	20th
14.	Sharing of best practices	0.466	19th	0.473	10th	0.848	21st
15.	Knowledge capturing/re-use	0.040	6th	0.034	4th	0.799	18th
16.	Transferring of existing knowledge into other parts of the organisation	0.227	15th	0.242	7th	0.101	7th
17.	Accessing valuable knowledge from outside sources	0.444	18th	0.309	9th	0.029	2nd
18.	Encouragement of team to share knowledge	0.866	23rd	0.962	23rd	0.984	23rd
19.	Interaction and socialization	0.152	13th	0.064	6th	0.085	5th
20.	Innovation and knowledge creation	0.001	1st	0.006	3rd	0.969	22nd
21.	Motivating workers to develop, share and use knowledge	0.049	8th	0.836	19th	0.773	17th
22.	Benchmarking techniques to improve its employees' competences	0.138	11th	0.269	8th	0.257	11th
23.	Building the right know-how and expertise	0.162	14th	0.001	1st	0.576	16th

Source: Field Survey (2015)

The significant level as shown in Table 4.11 refers to thedegree of an association between two variables which was derived from observed frequencies and expected frequencies of construction professional's against performance in terms of Time, Quality and Cost. Some of the results showing level of significance derived from observed and expected frequencies generated through SPSS against Time, Quality and Cost is presented in Appendix III. An association is significant if the level of significance is less than 0.05 andif the significant level is greater than 0.05 but less than 0.10, then the association is considered to be marginally significant (Meng, 2012). However, the smaller the significant level the closer the association between the variables (Meng, 2012). Table 4.11 provides a ranking result of Knowledge Management practice attributes as it links to performance which gives the construction industry an opportunity to prioritize the knowledge management practice attributes that has the most association on performance.

The result of the analysed data shows that, project time is significantly associated with "Innovation and knowledge creation" (0.001), "using assessable knowledge in decision making" (0.018), "stimulation of continuous learning" (0.025), "Accessing relevant information" (0.026), "knowledge friendly culture" (0.032), "knowledge capturing/reuse" (0.040) and "motivating workers to develop, share/use knowledge" (0.049) which is ranked First, second, third, Fourth, Fifth, Sixth and Seventh respectively. Project quality is significantly associated with "building the right know-how and expertise" (0.001), "stimulation of continuous learning" (0.002), "innovation/knowledge creation" (0.006) and "knowledge capturing/re-use" (0.040) which is ranked First, second, third and fourth respectively. Project cost is significantly associated with "using accessible knowledge in decision making" (0.005), "accessing valuable knowledge from outside" (0.029) and

"Accessing relevant information" (0.030) which was ranked first, second and third respectively.

As identified in this study the result of level of association between Time performance and Knowledge management practices has the most association. It shows that using accessible knowledge in decision making is important in improving performance.This conforms to Sodiya*et al*. (2006) statement that organisation success depends on the ability to make effective decision-making and proper utilization of knowledge of employee. The result of the level of association show that, Knowledge management has influence on performance as sighted in Kasimu*et al*. (2013) research on KM. This shows that, organisations can benefit in Knowledge management by improving the way project is being delivered which possibly can lead to reduction in construction rework, reduction in time and cost overruns in construction project.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The research assessed knowledge management practices on construction project performance in Abuja, Nigeria. The findings are thus summarised;

1. In the assessment of identified Knowledge Management Practice attributes, several attributes were identified such as Accessing relevant information, Knowledge sharing, using accessible knowledge in decision making etc. it was also found out that "Encouragement of team to share knowledge" was ranked first by Architects and Builders with RII= 0.83, and 0.87 respectively. "Transferring of existing knowledge into other parts of the organisation" (RII= 0.87) and "Encouraging knowledge transfer" (RII= 0.92, SD = 0.494) were ranked first by Quantity Surveyor's and Engineers. "Stimulation of continuous learning" (RII= 0.92) and "Senior management support/ commitment in knowledge creation, sharing and use" (RII= 0.92) were both ranked first by Estate surveyors.

2. The overall result on the most agreed practice of knowledge management is "Team encouragement to share knowledge" with RII of 0.87 showing that the practice is very significant.

3. The percentage level of adoption of KM indicates thatlarge firms adopts virtually all the 23 KM practice attributes identified in this study while small, medium and micro size firms just adopts few of those practices.

4. In the assessment of factors that affect the capture of project knowledge, several factors affecting the capture of project knowledge was identified such as Personnel changing companies or industry, Lack of standard platform to capture and share Knowledge, Employee retiring etc. However "Organisational culture" was ranked first by Architects, Engineers and Estate surveyors with RIIs of 0.90, 0.79, and 0.77 respectively. Standard platform to capture and share knowledge (RII=0.85) and Personnel changing companies or industry (RII=0.79) were ranked first by Builders and Quantity Surveyors respectively. In the overall assessment Standard platform to capture and share knowledge was ranked first with RII of 0.78 showing that it is very important.

5. In the assessment of factors that affect the reuse of project knowledge, factors such as Personnel changing companies or industry, Team being separated after completion of project, Lack of motivation etc.was identified. However"Teams being separated after completion of project" was ranked first by both Architects and Estate surveyor with RIIs of 0.90 and 0.92 respectively, "Motivation"was ranked first by both Builders and Quantity Surveyors with RIIs of 0.76 and 0.75 respectively. Then, Engineers ranked ''Organisational culture'' first with RII of 0.78.In the overall assessment, Team separation after completion of project was ranked first with RII of 0.77 showing that it is very significant.

6. In examining of the perceived effect of knowledge management practice on project performance, construction professionals ranked "Innovation and knowledge creation" (Mean = 3.97) first and providing access to collaborative IT systems (Mean = 3.38) least attributes that affect project cost. "Knowledge capturing/re-use"

(Mean = 3.77) was ranked first and "Providing access to collaborative IT systems" (Mean = 3.30) was ranked the least attributes that, affect project quality."Creating Suitable work related environment"(Mean = 4.23) was ranked first and"Facilitating Knowledge growth through culture and incentives" (Mean = 3.59) was ranked least attributes that, affect construction project performance.

7. The finding on perceived effect on Knowledge management practice on project performance shows that professionals perceived "Senior management support/ commitment in knowledge creation and use"to have the overall effect on performance as it was ranked overall first with mean of 3.96.

8. The Chi-square test reveals that completion time have significant association with"stimulating innovation and knowledge creation" (Sig level = 0.001) which was ranked first. Findings on project quality shows that "building the right know-how and expertise" (Sig level = 0.001) have significant association with Knowledge management attributes which was ranked first by construction professionals.Lastly "using accessible knowledge in decision making" (Sig level = 0.005) was found out to have significant association with project cost which was ranked first.

5.2 Conclusion

Based on the objectives of the research the following conclusions were made:

1. In the assessment of the importance of Knowledge Management Practices by professionals' in construction firms in Abuja, the research concluded that ''Team encouragement to share knowledge'' is the most accepted practice.It is also concluded in this study that large firms adopts KM practice the most.

2. In assessing the identified factors affecting the capture of project knowledge by professionals' it was concluded that "standard platform to capture and share knowledge" affect project knowledge the most."Team separation after completion of project" was also concluded to affect the reuse of project knowledge the most by construction professionals'.
3. "Senior management support/commitment in knowledge creation and use" is the most perceived practice by professionals to have the most effect on overall performance of project and the study concludes that "stimulating innovation and knowledge creation", "building the right know-how and expertise" and "using accessible knowledge in decision making" has the most significant association with project time, quality and cost respectively.

5.3 Recommendations

This study here by recommends the following based on the findings of this research;

1. The research recommends that, construction industry should focus on teamwork building among construction employees in order to improve knowledge management practice in the industry.
2. The research recommends the use of standard platforms to capture and share knowledge in order to prevent loss of project knowledge.
3. The study also recommends that team separation after completion of project should be properly managedin order to allow subsequent reuse of project knowledge.
4. The study recommends that firms should stimulate "innovation and knowledge creation", "building of right knowhow and expertise", and "using accessible

knowledge in decision making" as they are perceived to have significant association with performance.

5. Lastly, studies should be carried out on firms using a real performance data of a project to critically examine the effect of Knowledge management practice on project performance.

5.4 Contribution to Knowledge

The following are itemised as the possible contributions the study has made to knowledge;

1. The study to identified"Team encouragement to share knowledge" (RII = 0.87), Encouraging knowledge transfer (Mean =0.84), Motivating workers to develop, share and use knowledge (Mean = 0.84) etc. as the most prevalenceknowledge management practice attribute accepted in the construction industry in Abuja.

2. The study identified"standard platform to capture and share knowledge" (RII = 0.78),Organisational culture (RII = 0.77), Personnel changing companies or industry (RII = 0.71)and "Team separation after completion of project" (Mean = 3.86, RII = 0.77),Motivation (RII = 0.75, SD =1.006), Organisational Culture (RII = 0.75, SD = 0.858)etc. as factors that can affect the capture and re-use of project knowledge respectively.

3. The study examine knowledge management practice influence on project performance where "Senior management support/commitment in knowledge creation and use" (Mean = 3.96),Knowledge capturing/re-use (Mean = 3.91),

Teamwork Encouragement to share Knowledge (Mean = 3.88) etc. were identified to have overall effect on construction project performance.

4. Finally the study establish the Knowledge management practice attributes that have positive incidence on project performance such as “stimulating innovation and knowledge creation” (Sig level = 0.001), “Building the right know-how and expertise” (Sig level = 0.001), “using accessible knowledge in decision making” (Sig level = 0.005) on project time, project quality and project cost respectively.

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Appendix I

Department Of Building,
Faculty of Environmental Design,
Ahmadu Bello University, Zaria, Nigeria

Dear respondent

This questionnaire is administered for a post graduate research at the Department of Building, Ahmadu Bello University, Zaria. It is designed to get relevant information on PROFESSIONALS' PERCEPTION ON INFLUENCE OF KNOWLEDGE MANAGEMENT PRACTICES ON CONSTRUCTION PROJECT PERFORMANCE IN ABUJA, NIGERIA.

For easy understanding, **knowledge management** is **described as**; a process of systematic management of vital knowledge and its associated process of creating, gathering, organizing, diffusion, use and exploitation, which leads to organizations' effectiveness and efficiency.

I would like to stress that information provided by the respondents will be treated with utmost confidentiality and will be used strictly for academic purpose. I will be glad for your assistance in helping to fill the questionnaire to the best of your knowledge. Thank you in appreciation.

IdrisHamza

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SECTION A:RESPONDENT INFORMATION

Please indicate by Ticking **(✓)**

1. Name of company (optional) _____

2. Please indicate your profession in the construction industry
   a) Architect ( ) b) Builder ( ) c) Quantity surveyor ( )
   d) Engineers ( ) e) Estate surveyor ( )

3. Please indicate your Qualification
   a) Higher National Diploma (HND) ( ) b) Bachelor's degree ( ) c) Masters ( )
   d) Post Graduate Diploma (PGD) ( ) e) Others_____

4. Please indicate years of working experience
   a) 0 – 4 ( ) b) 5-10 ( ) c) 11-15 ( ) d) 16 above ( )

5. What is the size of your company?
   a) 0-9 workers ( ) b) 10-99 workers ( ) c) 100-299 workers ( ) d) Over 300 workers ( )

6. Please specify if your company has branch elsewhere
   Yes ( ) No ( ).

If No - Do you have project outside FCT Abuja please specify. Yes ( ) No ( ).

If No please give reason _____

SECTION B: IDENTIFYING KNOWLEDGE MANAGEMENT PRACTICES

7. Please indicate with your level of agreement with each statement/item indicating knowledge management (KM) practice in Nigerian construction industry. i.e. 1=**Strongly Disagree**, 2=**Disagree**, 3=**Neutral**, 4= **Agree**, 5= **Strongly Agree**

Please indicate by Ticking **(✓)**

S/N	KM practice attributes	1	2	3	4	5		Q8
1.	Accessing relevant informationpertaining to task through availability of Information technologies and systems							
2.	Employee encouragement to share knowledge (Knowledge sharing)							
3.	Using accessible knowledge in decision making.							
4.	Providing access to collaborative IT systems.							
5.	Senior management support / commitment in knowledge creation sharing and use.							
6.	Creating suitable work related environments.							
7.	Stimulation of continuous learning.							
8.	Employees training aimed at enhancing employee's involvement in knowledge creation and sharing (Employee training)							
9.	Generating new knowledge.							
10.	Facilitating knowledge growth through culture and incentives.							
11.	Knowledge Reuse							
12.	Knowledge-friendly culture							
13.	Encouraging knowledge transfer							
14.	Sharing of best practices							
15.	Knowledge capturing / re-use							
16.	Transferring existing knowledge into other parts of the organization.							
17.	Accessing valuable knowledge from outside sources							
18.	Team encouragement to share knowledge							
19.	Interaction and socialization							
20.	Innovation and knowledge creation.							
21.	Motivating workers to develop, share, and use knowledge							

22.	Benchmarking techniques to improve its employees' competences.							
23.	Building the right know-how and expertise							
24.	Others please specify below							

8. Please indicate which of the **KM practices** above is adopted byyour firm byTicking (✓) on **Q8** on the side of the table.

9. If some of the item/ statement are not applicable in your Firm, Please indicate the **Knowledge Management practices** (KMP) commonly carried out by your Firm.

_____
_____
_____
_____
_____

SECTION C: ASSESSEMENT OF FACTORS AFFECTING PROJECT KNOWLEDGE

10. Please indicate withyourlevel of agreement with the following factors affecting the**capture /reuse of project knowledge in Nigeria construction industry** .i.e. 1-**Strongly Disagree,** 2-**Disagree**, 3-**Nuetral**, 4- **Agree**, 5- **Strong Agree**

Please Kindly Tick (✓)

S/N	**Factors affecting the** capture of project knowledge	1	2	3	4	5
1.	Personnel changing companies or industry,					
2.	Standard platform to capture and share knowledge					
3.	Employees retiring					
4.	Employees transfer					
5.	Viewing knowledge as competitive edge					
6.	Outsourcing					
7.	Organizational culture					
8.	Others (please specify)					

Please Kindly Tick (✓)

S/N	**Factors affecting the** reuse of project knowledge	1	2	3	4	5
1.	Personnel changing companies or industry,					
2.	Teams being separated after completion of a project,					
3.	Motivation					
4.	Organizational culture					
5.	Self confidence					
6.	Employees retiring					
7.	Death					
8.	Others (please specify)					

SECTION D: PERCEIVED EFFECT OF KM PRACTICES ON PROJECT PERFORMANCE

11. Please indicate with level of impact how the following statements indicating Knowledge management practice affect building project performance in term of,**Cost ,Quality** and **Time**.
Please use the table below to Tick (✓).

Project Cost		Project Quality		Project Time	
No Impact	1	No Impact	1	No Impact	1
Very low Impact	2	Very low Impact	2	Very low Impact	2
low Impact	3	low Impact	3	low Impact	3
Moderate Impact	4	Moderate Impact	4	Moderate Impact	4
Very high Impact	5	Very high Impact	5	Very high Impact	5

Please indicate by **Ticking (✓)**using the table above

S/N	KM practices	Project Cost					Project Quality					Project Time				
		1	2	3	4	**5**	1	2	3	4	**5**	1	2	3	4	**5**
1.	Accessing relevant informationpertaining to task through availability of Information technologies and systems															
2.	Employee encouragement to share knowledge (Knowledge sharing)															
3.	Using accessible knowledge in decision making.															
4.	Providing access to collaborative IT systems.															
5.	Senior management support /commitment in knowledge creation sharing and use															
6.	Creating suitable work related environments.															
7.	Stimulation of continuous learning															
8.	Employees training aimed at enhancing employee's involvement in knowledge creation and sharing (Employee training)															

9.	Generating new knowledge.															
10.	Facilitating knowledge growth through culture and incentives.															
11.	Knowledge Reuse															
12.	knowledge-friendly culture															
13.	Encouraging knowledge transfer															
14.	Sharing of best practices															
S/N	**KM practices**	Project Cost					Project Quality					Project Time				
		1	2	3	4	**5**	1	2	3	4	**5**	1	2	3	4	**5**
15.	Knowledge capturing / re-use															
16.	Transferring existing knowledge into other parts of the organization.															
17.	Accessing valuable knowledge from outside sources															
18.	Team encouragement to share knowledge															
19.	Interaction and socialization															
20.	Innovation and knowledge creation.															
21.	Motivating workers to develop, share, and use knowledge															
22.	Benchmarking techniques to improve its employees' competences.															
23.	Building the right know-how and expertise															
24.	Others please specify below															

Appendix II

Table 1: Perceived effect of KM practice attributes on project time

S/N	Knowledge Management Practice Attributes	Project Time Frequency of response					Σf	Σfx	Mean	SD	RII	Rank
		1	2	3	4	5						
1	Accessing relevant information pertaining to task	2	5	23	44	34	108	427	3.95	0.941	0.79	10th
2	Knowledge sharing	0	15	22	52	22	111	414	3.73	0.934	0.75	17th
3	Using accessible knowledge in decision making	2	2	32	41	34	111	436	3.93	0.912	0.79	9th
4	Providing access to collaborative IT systems	0	6	34	41	30	111	428	3.86	0.883	0.77	14th
5	Senior management support / commitment in knowledge creation sharing and use	0	4	24	29	54	111	466	4.20	0.903	0.84	2nd
6	Creating Suitable work related environment	0	5	23	24	59	111	470	4.23	0.934	0.85	1st
7	Stimulation Of Continuous Learning	0	8	21	35	47	111	454	4.09	0.949	0.82	4th
8	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	0	9	21	48	33	111	438	3.95	0.903	0.79	8th
9	Generating New Knowledge	3	8	37	33	30	111	412	3.71	1.030	0.74	22nd
10	Facilitating Knowledge growth through culture and incentives	4	11	30	48	18	111	398	3.59	0.995	0.72	23rd
11	Knowledge Reuse	7	8	20	44	32	111	419	3.77	1.134	0.75	19th
12	Knowledge-friendly Culture	4	5	37	41	24	111	409	3.68	0.981	0.74	21th
13	Encouraging knowledge transfer	4	5	35	45	22	111	409	3.68	0.963	0.74	20th
14	Sharing of best practices	4	5	20	52	30	111	432	3.89	0.976	0.78	13th
15	Knowledge capturing/re-use	3	5	19	45	39	111	445	4.01	0.977	0.80	7th
16	Transferring of existing knowledge into other parts of the organisation	0	2	35	37	37	111	442	3.98	0.853	0.80	5th
17	Accessing valuable knowledge from outside sources	0	8	29	55	19	111	418	3.77	0.820	0.75	15th
18	Teamwork Encouragement to share Knowledge	0	4	26	33	48	111	458	4.13	0.896	0.83	3rd
19	Interaction and socialization	5	4	31	41	30	111	420	3.78	1.030	0.76	16th
20	Innovation and knowledge creation	0	3	32	48	28	111	434	3.91	0.804	0.78	11th
21	Motivating workers to develop, share and use knowledge	3	7	20	48	33	111	434	3.91	0.987	0.78	12th
22	Benchmarking techniques to improve its employees' competences	3	5	39	35	29	111	415	3.74	0.988	0.75	18th
23	Building the right know-how and expertise	0	6	30	34	41	111	443	3.99	0.929	0.80	6th

Source: *field survey* (2015)

Table 2: Perceived effect of KM practice attributes on project quality

S/N	Knowledge Management Practice Attributes	Project Quality Frequency of response					Σf	Σfx	Mean	SD	RII	Rank
		1	2	3	4	5						
1	Accessing relevant information pertaining to task	4	18	30	44	15	111	381	3.43	1.032	0.69	19th
2	Knowledge sharing	10	14	28	36	23	111	381	3.43	1.211	0.69	20th
3	Using accessible knowledge in decision making	5	16	37	39	14	111	374	3.37	1.026	0.67	22nd
4	Providing access to collaborative IT systems	0	25	42	30	14	111	366	3.30	0.959	0.66	23rd
5	Senior management support / commitment in knowledge creation sharing and use	5	8	23	52	23	111	413	3.72	1.020	0.74	4th
6	Creating Suitable work related environment	4	15	24	42	26	111	404	3.64	1.094	0.73	9th
7	Stimulation Of Continuous Learning	5	8	22	48	28	111	419	3.77	1.050	0.75	2nd
8	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	5	12	18	53	23	111	410	3.69	1.060	0.74	7th
9	Generating New Knowledge	5	22	25	41	18	111	378	3.41	1.115	0.68	21st
10	Facilitating Knowledge growth through culture and incentives	5	15	31	34	26	111	394	3.55	1.126	0.71	17th
11	Knowledge Reuse	10	8	19	41	33	111	412	3.71	1.224	0.74	8th
12	Knowledge-friendly Culture	7	5	38	36	25	111	400	3.60	1.081	0.72	12th
13	Encouraging knowledge transfer	10	6	26	46	23	111	399	3.59	1.147	0.72	13th
14	Sharing of best practices	6	7	23	52	23	111	412	3.71	1.039	0.74	5th
15	Knowledge capturing/re-use	0	12	27	47	25	111	418	3.77	0.924	0.75	1st
16	Transferring of existing knowledge into other parts of the organisation	0	14	34	52	11	111	393	3.54	0.840	0.71	14th
17	Accessing valuable knowledge from outside sources	3	6	46	45	11	111	388	3.50	0.851	0.70	18th
18	Teamwork Encouragement to share Knowledge	3	15	19	45	29	111	415	3.74	1.076	0.75	3rd
19	Interaction and socialization	0	16	34	44	17	111	395	3.56	0.921	0.71	15th
20	Innovation and knowledge creation	2	17	21	52	16	108	387	3.58	1.050	0.72	11th
21	Motivating workers to develop, share and use knowledge	5	11	25	51	19	111	401	3.61	1.028	0.72	10
22	Benchmarking techniques to improve its employees' competences	5	12	30	43	21	111	396	3.57	1.058	0.71	16
23	Building the right know-how and expertise	5	11	19	52	24	111	412	3.71	1.056	0.74	6

Source: *field survey* (2015)

Table 3: Perceived effect of KM practice attributes on project cost

S/N	Knowledge Management Practice Attributes	Project Cost Frequency of response					Σf	Σfx	Mean	SD	RII	Rank
		1	2	3	4	5						
1	Accessing relevant information pertaining to task	2	9	34	42	24	111	410	3.69	0.961	0.74	16th
2	Knowledge sharing	2	11	46	31	21	111	391	3.52	0.971	0.70	20th
3	Using accessible knowledge in decision making	2	16	42	28	23	111	387	3.49	1.035	0.70	21st
4	Providing access to collaborative IT systems	2	20	41	30	18	111	375	3.38	1.019	0.68	23rd
5	Senior management support / commitment in knowledge creation sharing and use	3	8	20	40	40	111	439	3.95	1.039	0.79	3rd
6	Creating Suitable work related environment	0	12	37	30	32	111	415	3.74	0.997	0.75	9th
7	Stimulation Of Continuous Learning	3	10	26	41	29	109	410	3.76	1.035	0.75	10th
8	Employee training aimed at enhancing employee's involvement in knowledge creation and sharing	0	8	40	44	19	111	407	3.67	0.846	0.73	18th
9	Generating New Knowledge	0	13	32	44	22	111	408	3.68	0.926	0.74	13th
10	Facilitating Knowledge growth through culture and incentives	3	13	23	55	17	111	403	3.63	0.972	0.73	19th
11	Knowledge Reuse	3	5	31	53	19	111	413	3.72	0.896	0.74	14th
12	Knowledge-friendly Culture	3	4	35	48	21	111	413	3.72	0.906	0.74	15th
13	Encouraging knowledge transfer	6	5	27	53	20	111	409	3.68	1.000	0.74	17th
14	Sharing of best practices	3	5	31	45	27	111	421	3.79	0.955	0.76	6th
15	Knowledge capturing/re-use	0	5	28	44	34	111	440	3.96	0.863	0.79	2nd
16	Transferring of existing knowledge into other parts of the organisation	0	5	38	39	29	111	425	3.83	0.873	0.77	4th
17	Accessing valuable knowledge from outside sources	0	10	34	45	22	111	412	3.71	0.888	0.74	11th
18	Teamwork Encouragement to share Knowledge	3	3	39	37	29	111	419	3.77	0.960	0.75	8th
19	Interaction and socialization	6	12	42	24	27	111	387	3.49	1.135	0.70	22nd
20	Innovation and knowledge creation	0	2	27	54	28	111	441	3.97	0.756	0.79	1st
21	Motivating workers to develop, share and use knowledge	0	8	30	50	23	111	421	3.79	0.854	0.76	5th
22	Benchmarking techniques to improve its employees' competences	0	8	36	36	31	111	423	3.81	0.929	0.76	7th
23	Building the right know-how and expertise	0	4	33	36	38	111	412	3.71	0.889	0.74	12th

Source: *field survey* (2015)

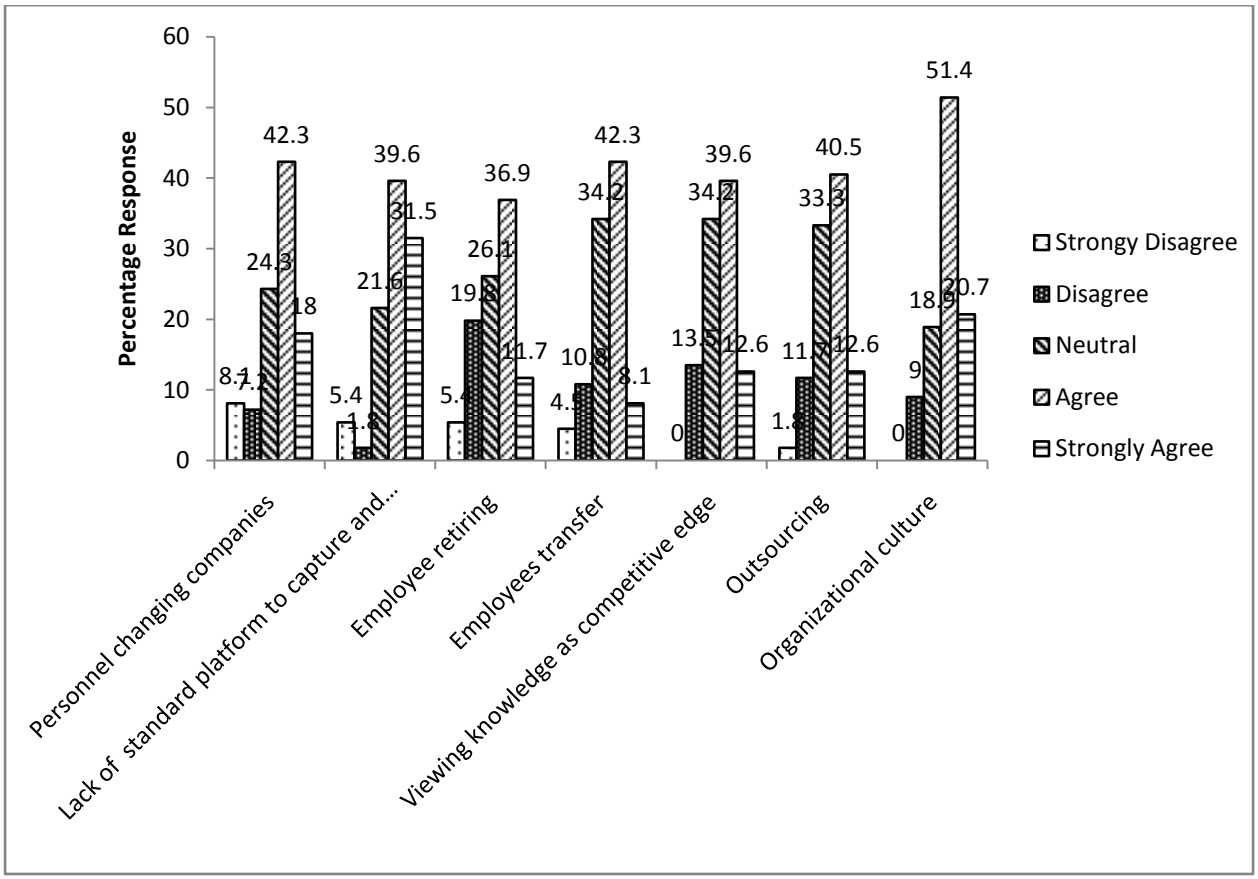


Figure 1: Percentage responses on factors affecting the capture of project knowledge

Source: *field survey* (2015)

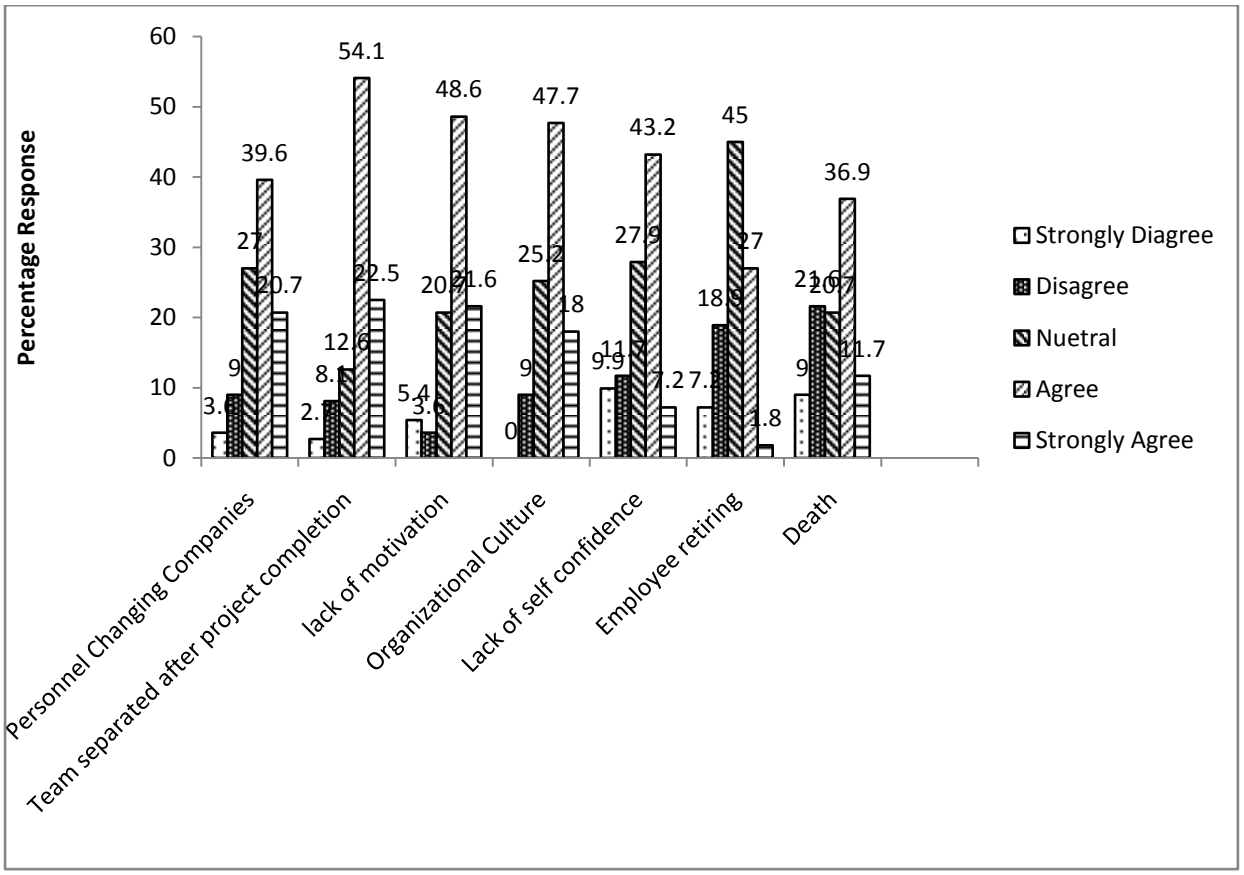


Figure 2: Percentage responses on factors affecting the reuse of project knowledge

Source: *field survey* (2015)

Appendix III

Table 1:Test for significance association forprojecttime

Crosstab

Professional's in the construction industry		Accessing to relevant information pertaining to task					
		No Impact	Very Low Impact	Low Impact	Moderate Impact	Very High Impact	Total
Architect	% within Professional's in the construction industry			47.6%	38.1%	14.3%	100.0%
	% within Employee access to relevant information			43.5%	18.2%	8.8%	19.4%
	% of Total			9.3%	7.4%	2.8%	19.4%
Builder	% within Professional's in the construction industry	5.3%		15.8%	47.4%	31.6%	100.0%
	% within Employee access to relevant information	100.0 %		26.1%	40.9%	35.3%	35.2%
	% of Total	1.9%		5.6%	16.7%	11.1%	35.2%
Quantity surveyor	% within Professional's in the construction industry		33.3%	13.3%	53.3%		100.0%
	% within Employee access to relevant information		100.0%	8.7%	18.2%		13.9%
	% of Total		4.6%	1.9%	7.4%		13.9%
Engineers	% within Professional's in the construction industry			17.2%	17.2%	65.5%	100.0%
	% within Employee access to relevant information			21.7%	11.4%	55.9%	26.9%
	% of Total			4.6%	4.6%	17.6%	26.9%
Estate Surveyor	% within Professional's in the construction industry				100.0%		100.0%
	% within Employee access to relevant information				11.4%		4.6%
	% of Total				4.6%		4.6%
Total	% within Professional's in the construction industry	1.9%	4.6%	21.3%	40.7%	31.5%	100.0%
	% within Employee access to relevant information	100.0 %	100.0%	100.0%	100.0%	100.0 %	100.0%
	% of Total	1.9%	4.6%	21.3%	40.7%	31.5%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	72.003[a]	16	0.000
Likelihood Ratio	64.663	16	0.000
Linear-by-Linear Association	**4.949**	**1**	**0.026**
N of Valid Cases	108		

a. 16 cells (64.0%) have expected count less than 5. The minimum expected count is .09.

Table 2:Test for significance association for projectcost

Crosstab

Professional's in the construction industry		Accessing to relevant information pertaining to task					
		No Impact	Very low Impact	Low Impact	Moderate Impact	Very high Impact	Total
Architect	% within Professional's in the construction industry			33.3%	54.2%	12.5%	100.0%
	% within Employee access to relevant information			26.7%	29.5%	20.0%	21.6%
	% of Total			7.2%	11.7%	2.7%	21.6%
Builder	% within Professional's in the construction industry	5.3%	15.8%	28.9%	36.8%	13.2%	100.0%
	% within Employee access to relevant information	50.0%	33.3%	36.7%	31.8%	33.3%	34.2%
	% of Total	1.8%	5.4%	9.9%	12.6%	4.5%	34.2%
Quantity surveyor	% within Professional's in the construction industry			26.7%	73.3%		100.0%
	% within Employee access to relevant information			13.3%	25.0%		13.5%
	% of Total			3.6%	9.9%		13.5%
Engineers	% within Professional's in the construction industry	6.9%	31.0%	24.1%	13.8%	24.1%	100.0%
	% within Employee access to relevant information	50.0%	50.0%	23.3%	9.1%	46.7%	26.1%
	% of Total	1.8%	8.1%	6.3%	3.6%	6.3%	26.1%
Estate Surveyor	% within Professional's in the construction industry		60.0%		40.0%		100.0%
	% within Employee access to relevant information		16.7%		4.5%		4.5%
	% of Total		2.7%		1.8%		4.5%
Total	% within Professional's in the construction industry	3.6%	16.2%	27.0%	39.6%	13.5%	100.0%
	% within Employee access to relevant information	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	3.6%	16.2%	27.0%	39.6%	13.5%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	36.445[a]	16	0.003
Likelihood Ratio	45.081	16	0.000
Linear-by-Linear Association	4.730	1	0.030
N of Valid Cases	111		

a. 16 cells (64.0%) have expected count less than 5. The minimum expected count is .18.

Table 3:Test for significance association for project quality

Crosstab

Professional's in the construction industry		Accessing to relevant information pertaining to task					
		No Impact	Very Low Impact	Low Impact	Moderate Impact	Very High Impact	Total
Architect	% within Professional's in the construction industry			41.7%	33.3%	25.0%	100.0%
	% within Employee access to relevant information			29.4%	19.0%	25.0%	21.6%
	% of Total			9.0%	7.2%	5.4%	21.6%
Builder	% within Professional's in the construction industry	5.3%		50.0%	26.3%	18.4%	100.0%
	% within Employee access to relevant information	100.0%		55.9%	23.8%	29.2%	34.2%
	% of Total	1.8%		17.1%	9.0%	6.3%	34.2%
Quantity surveyor	% within Professional's in the construction industry			33.3%	66.7%		100.0%
	% within Employee access to relevant information			14.7%	23.8%		13.5%
	% of Total			4.5%	9.0%		13.5%
Engineers	% within Professional's in the construction industry		20.7%		48.3%	31.0%	100.0%
	% within Employee access to relevant information		66.7%		33.3%	37.5%	26.1%
	% of Total		5.4%		12.6%	8.1%	26.1%
Estate Surveyor	% within Professional's in the construction industry		60.0%			40.0%	100.0%
	% within Employee access to relevant information		33.3%			8.3%	4.5%
	% of Total		2.7%			1.8%	4.5%
Total	% within Professional's in the construction industry	1.8%	8.1%	30.6%	37.8%	21.6%	100.0%
	% within Employee access to relevant information	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	1.8%	8.1%	30.6%	37.8%	21.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	61.414[a]	16	0.000
Likelihood Ratio	70.482	16	0.000
Linear-by-Linear Association	**.002**	**1**	**0.961**
N of Valid Cases	111		

a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is .09.