

Evaluating and Implementing Knowledge Management among Construction Practitioners: A Vital Tool for Construction Project Delivery

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ABSTRACT: This research work examined the areas of the construction industry that will improve as a result of the contributions of knowledge management. Data for the analysis were collected through questionnaires administered on construction practitioners. Opinions were sought by means of questionnaires, and these questionnaires were distributed in large quantities of both soft and hard copy. A total of 115 responses were gotten afterwards, through the use of survey monkey and was been analysed by the survey monkey, analysis of all responses was used and the following results were gotten from the under listed question. Generally, how would you rate construction Extent of awareness of Knowledge Management? 1.06%, 10.64%, 44.68%, 37.23%, 6.38% were the responses for not been aware at all, Low, Moderate, High, very high. The study revealed that the knowledge management adoption is being hindered the most in Nigeria by funding follows by this percentage, Funding 36.56, Lack of time and understanding of (KM)25.81%, Lack of proper technical expertise15.05%, Lack of successful (KM) model in the construction industry 22.58% as there is no adequate fund to carry it out in construction organizations. The study also reveal that the practice of KM in the Nigerian construction industry is at in infancy stage. The research aim is to appraise and develop a conceptual model which can be used to analyse knowledge management among construction practitioners as a vital tool for construction project delivery in South-South Nigeria. The research objectives are to systematically review previous studies on KM application in construction industry and determine and how its implementation in construction setting will help facilitate timely construction project delivery. To appraise and compare the ways from previous studies in which construction practitioners can use to modernize their knowledge in order to achieve sustainable construction projects delivery. To Evaluate how

knowledge management can be synergized between construction practitioners and project managers. To recommend practical ways on how knowledge management should be adopted by construction practitioners in the Nigerian construction industry. The project covers the following area, the overview of knowledge managements, knowledge management tools and systems and knowledge management in deliveries of construction project In the South -South region of Nigeria, During the course of this research, the authors relied only on information published in peer-reviewed journal articles and knowledge management reports, which formed secondary and primary sources of data for this study. The work was limited to project-based organizations in the South-South region of Nigeria. Financial resources were a hindrance during the course of this research work. In conclusion, it was observed that internet 29.70% was ranked first among the sources of knowledge available to construction practitioners in Nigeria as most construction practitioners in Nigeria don't read much and are not exposed to other methods of acquiring knowledge within the organization, and fund 36.56% is the highest ranked problem hindering the adoption of knowledge management among Construction Practitioners. It was then recommended that Civil Engineers, Builders, Middle managers, Lower managers and Technicians should improve in the level at which they transfer and share knowledge with other construction practitioners and that the Federal Government of Nigeria should inject more fund to the construction industry of the country as this is a very productive sector of the economy.

KEYWORDS: Knowledge management, Construction Practitioners, Construction Project Delivery, Construction Industry.

I. INTRODUCTION

Knowledge Management (KM) in organizations can be studied from deferent

perspectives: technologies for knowledge creation, knowledge sharing, organizational culture, leadership, knowledge architecture, organizational learning, etc. There are fragmented approaches to KM that have been adopted in many organizations. These approaches may be classified into two types: soft and hard. The soft approach has mainly investigated the role of tacit knowledge and the difficulties in sharing it between people. The hard approach has focused on developing tools for storage and distribution of explicit knowledge. Various types of information technology, such as video conferencing, can support KM in a geographically distributed organization, but there has been some doubt about their performance (Shin, 2004). Dennis, 1999, Desouza, 2003; Spiegler, 2003, Shin, 2004 have found that virtual face-to-face interaction through such technology does not lead to effective knowledge-sharing for reasons such as contextual ignorance or limited cognitive capability. One questionable assumption of the hard approach is that making information available will automatically make people more knowledgeable. In a global competitive market, KM adoption among companies at an early stage is seen to further enhance competitive advantage compared with companies which do not adopt it.

Consequently, as stated by Chong, Chong and Yeow (2006), various empirical and theoretical evidences have proven KM to be a key source of competitive advantage and subsequently leading to organizational success. In the current knowledge-based economy, knowledge resources are considered as the most crucial and complicated resource to be managed in a competitive environment Pablos (2004). With more competitors entering the marketplace, companies have to fully utilize their knowledge resources in order to become business leaders in a particular industry. KM helps organizations in developing synergies between disparate knowledge objects resulting in an increased-on innovations Chua, Lam, (2005). As such, KM has become the only solution for organizations, big or small, local or multinational to be at the forefront of business success. In this view, knowledge management is considered to be a systematic and organized attempt to use knowledge within a company to transform its ability to generate, store and use knowledge in order to improve performance. To illustrates figure 1 show how vital KM implementation is to the construction industry. While figure 2 outline the risk implementation of KM.

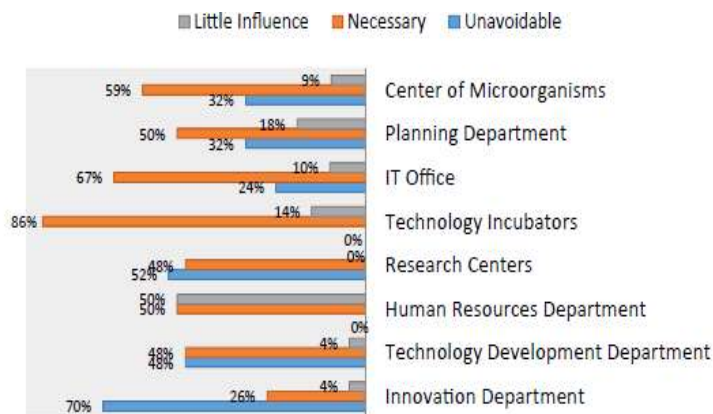


Figure 1: The Importance Rate of Implementation of KM



Figure 2: Level of Risk Implementation of KM in Different Departments (Gharamaleki, 2008)

Of all the studies done so far for publication, little or no emphasis is laid on evaluating and implementing knowledge management (KM) among construction practitioners, especially in Nigerian Construction industry. Knowledge management is based on the premise that, just as human beings are unable to draw on the full potential of their brains, organizations are generally not able to fully utilize the knowledge that they possess. Through KM, organizations seek to acquire or create potentially useful knowledge and to make it available to those who can use it at a time and place that is appropriate for them to achieve maximum effective usage in order to positively influence organizational performance. Knowledge management in organizations is neglected because often at times construction practitioners are also faced with the context of learning and implementation of new ideas. The typical construction organization does not encourage the culture of sharing knowledge. Wates Group, a medium sized UK building company, stated it took four and a half years before staff accepted the concept of sharing knowledge (Barlow & Jashapara, 1998).

Due to the importance of the construction sector to the Nigerian economy, KM in the Nigerian Construction industry readily became an interesting area of research. This is so because the study or adoption of KM in construction projects is still in its infancy, especially in Nigeria (Zuofa, Ochieng and Burns 2014). This has made this

research a novel or redeemer to the Nigerian construction industry. There have little or no adoption of KM in the Nigerian construction industry over the years. This research work is vital since it will assess, evaluate and proffer practical ideas on a better and workable approach for an adoption of KM in the Nigerian construction industry. This study aims at providing an insight on the evaluation and implementation of knowledge management among construction practitioners as a vital tool for timely construction projects delivery.

II. LITERATURE REVIEW

2.1 SIGNIFICANT OF KNOWLEDGE MANAGEMENT

There is no universally accepted definition of knowledge management. But there are numerous definitions proffered by experts. Put very simply, knowledge management is the conversion of tacit knowledge into explicit knowledge and sharing it within the organization. Putting it more technically and accurately, knowledge management is the process through which organizations generate value from their intellectual and knowledge-based assets. Defined in this manner, it becomes apparent that knowledge management is concerned with the process of identifying, acquiring, distributing and maintaining knowledge that is essential to the organization. Figure 3 depicts a global explanation of the term knowledge management.

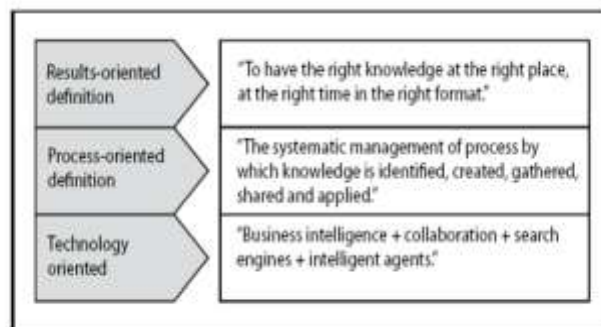


Figure 3: Explanation of Knowledge Management (Hansen And Nohria 2017)

2.2 Construction Professionals in Nigeria Versus KM

The construction industry is made up of both the formal sector and informal sector, with the formal sector consisting of organized companies. Due to the multi-disciplinary nature of the industry the formal sector consists of the Architects, the Quantity Surveyors, the Estate Surveyors, the Civil Engineers and the Builders (Fadamiro and

Ogunsemi 1996). All these professionals join forces together to promote the construction industry. The informal sector consists of trades and artisans; but for this purpose, knowledge is acquired transferred and managed within the industry with the construction professionals responsible for these. The construction of a project of any kind be it building, civil or heavy engineering works involves the services of many

people directly and indirectly (Fadamiro and Ogunsemi 1996).

These are people responsible for the overall design, construction and maintenance of a construction project from inception to completion. They are even involved in the sales and/or letting of the property on practical completion. Hence, they carry the course of construction industry's workload and most of the construction project managers available today are construction professionals that have construction knowledge as background. However, it is necessary to have a thorough knowledge of the professionals in the industry and the interrelationship that exist between them. Bamisile, (2003), affirms from observation that, there seems to be confusion and misinterpretation of the roles of these professionals within the construction industry in developing countries in general and in Nigeria in particular due to many factors. One of which is lack of proper working knowledge on the part of majority of people as to the roles of each professionals in the industry. It was further that the construction industry is unique when compared with other industries in terms of design and manufacturing of its product in which case the design phase is separated from the construction phase (except for some modern procurement method). While Architect and some sections of the engineering profession (civil engineers) carry out the design of the buildings, the cost control and the construction are the role of the Quantity Surveyors and builders respectively. The Estate Surveyors on the completion of the project is responsible for its marketing through outright sales, leasing or letting as appropriate.

According to Ruggles (1998) considers knowledge management as, "an approach to adding or creating value by more actively leveraging the knowhow, experience and judgment resident within, and in many cases, outside the organization." According to Bassi (1998) knowledge management is a means to an end not an end in itself. Therefore, knowledge management initiatives must be linked to strategies. Strategy influences knowledge generation and use by providing a context for the perception and interpretation of the environment and a boundary to decision-making. Organizations need the focus of a well-defined knowledge management strategy in order to establish the appropriate priorities. Therefore, enterprises must develop, implement and improve proactive knowledge management strategies. Hansen et al (1999) argue that there are two different types of knowledge management strategies. The first is called the codification

strategy, which focuses on the computer. In this instance, knowledge is carefully coded and stored on database systems where it can be accessed and used by others. The second strategy they identified is called the personalization strategy. This strategy focuses on helping people communicate knowledge as opposed to storing it. Hansen et al (1999) noted that the strategy chosen depends on how the company serves its clients, the economics of the business and the people it hires. The researcher acknowledge that it is imperative to have a certain minimum critical codification of knowledge and information. In other words, it is important to represent or codify knowledge, which refers to the process of putting knowledge into various forms that can be accessed, leveraged and transferred. However, our research focuses more on connecting people to facilitate communication, collaboration and co-ordination.

2.3 KNOWLEDGE MANAGEMENT AND THE NIGERIAN CONSTRUCTION INDUSTRY

Knowledge management has become an increasingly important issue due to rapid changes in markets conditions, competition and technological developments which have led to changes in work and the way work is organized. Knowledge management is considered vital for the survival of organization. It is asserted that knowledge is fast overtaking capital and labor as the key economic resource in advanced economies Edvinsson, (2000). Knowledge management is particularly important for the construction industry, for at least three main reasons. Firstly, the construction industry is widely perceived as an industry with low productivity and poor performance despite its importance in the national economy. Hence, there is a need for KM to improve the existing processes and management of construction companies Preece, Moodley, & Hyde, (2000) Secondly, the project-based nature of the industry has made it particularly important to record and transfer lessons from one project to another Rezgui, (2001). Thirdly, construction companies today face various challenges and new solutions are necessary to meet the growing demand for new types of buildings and structures Mior, & Abdul-Rashid, (2001). It is widely accepted that the current market dynamics and the trends towards specialized and customer-oriented services in the construction industry demand a more efficient and effective application of knowledge within corporate as well as project organizations Egbu, Sturgesand, (1999). Snyman, Kruger, (2004). Moodley, Preece, Kyprianou,

(2001) Rezgui, (2001). A number of researchers have acknowledged the limitations of current approaches to managing information and knowledge relating to and arising from a construction project Preece, Moodley, & Hyde, (2000); Mior, & Abdul-Rashid, (2001). Egbu, Sturgesand, & Bates (1999); Snyman, & Kruger, (2004). Rezgui, (2001). Preece, Moodley, & Hyde, (2000) states that the lessons learnt in SA construction projects are not organized well and are buried in details. This makes it difficult to compile and disseminate useful knowledge to other projects. The fragmentation of the construction industry has also been identified as a critical barrier to achieving efficient communication among parties (and individuals) within a project team working together on construction projects Mior and Abdul-Rashid, (2001); Egbu, Sturgesand and Bates, (1999); Latham, (1994); Rezgui (2001). Reviewing the literature on knowledge management in construction reveals that knowledge can be captured, created, stored, used, protected and essentially managed, not unlike any other economic commodities Geoff and Batt (1994). The initiative, explicit and factual nature of knowledge makes it amenable to ICT manipulation. However, upon closer inspection it is not clear in what sense knowledge is different from information. Information represents data arranged in a meaningful pattern; where intellectual input has been added to raw data, data in turn represents raw numbers, images words and sounds which are derived from observation or measurements. Although information is required for the creation of knowledge but knowledge makes information meaningful and guides to what data to be collected, thus the dynamic nature of knowledge (Kazi, Hannus and Charoenngam 1999).

2.4 BARRIERS TO KNOWLEDGE MANAGEMENT IN THE CONSTRUCTION INDUSTRY

The typical construction organization does not encourage the culture of sharing knowledge. Wates Group, a medium sized UK building company, stated it took four and a half years before staff accepted the concept of sharing knowledge Barlow, & Jashapara, (1998). Primarily, the cultures of the organizations need to be addressed if KM is to be of benefit. Each organization has its individual culture and only they can say what initiatives need to be set up to encourage a culture change. There are many other barriers to the successful implementation of KM within a construction enterprise. These according to Kazi, Hannus, Charoenngam, (1999). include: Lack of

Time; Trying to solve large problems; Converting Knowledge; Large number of SMEs; Multi-Disciplinary Teams; Unique Projects; Lack of Learning; Lengthy Time Period; Loss of faith; and IT Support

2.5 REQUIREMENTS OF A KNOWLEDGE MANAGEMENT SYSTEM

For any IT system to be classified as a Knowledge Management system according to Andawei, (2001). It must fulfil a number of requirements:

It must support the full KM lifecycle – from knowledge creation through distribution and management to retirement – and not just a subset thereof, There should be appropriate mechanisms for validation and authentication of the knowledge encapsulated in the system, The system should be able to seamlessly integrate with existing legacy IT systems within a real or virtual organization, Flexibility and ease of use are essential components of the system, as they are crucial for ensuring its acceptability and utilization, The knowledge contained within the system must be well maintained and up-to-date. This is essential for building up user confidence in the system and ensuring that decisions are based on the latest information available. The system must be designed in accordance with an organization's goals, culture and business processes. End-user involvement in the design and implementation of the system is crucial in this regard.

2.6 KNOWLEDGE MANAGEMENT, INTELLECTUAL CAPITAL AND INNOVATION

Innovation is a complex phenomenon. Despite diverse perspectives, many researchers are in agreement on the importance of innovation as a pre-requisite for competitive advantage. Innovations come from many different sources and exist in many different forms. In order to create an environment conducive to innovation, it could be argued that there needs to be an effective management of this complex process Stephen, (2009). Thus, increased attention is focused on KM and IC management as a possible pre-requisite to successful innovation. In the last decade there has been a shift in management focus from traditional accountancy practices where financial capital is paramount, to growing realization that intangible assets are of greater significance in our knowledge-based economy Egbu, Botterill, & Bates, (2001). However, the Gottlieb Duttweiler Foundation found that only 20% of knowledge available to an organization is actually used Nonaka, & Takeuchi, (1995). Knowledge can be a valuable resource for

competitive advantage and harnessing its value is one of the pre-eminent challenges of management. Identifying and exploiting knowledge assets, or intellectual capital (IC), has been vastly documented. There are different types of knowledge in an organization from the tacit knowledge of individuals, which is unarticulated and intuitive, to explicit knowledge that is codified and easily transmitted (Sharimllah, Siong and Hishamuddin, 2009).

Further distinctions have been made by academics and practitioners involved in the IC debate. Three components of intellectual capital have been identified comprising human, structural and customer capital Andawei, (2001). Clearly, structural capital describes the internal structure of an organization, such as its strategies, core competencies and culture, which is always context specific. Customer capital encompasses the external intangible assets of an organization. External forces play a part in determining the market position and strength of an organization. Customers are the principal determinants of this position as observed by. However, According to Edvinsson, (2000) asserted that human capital in an organization is the most important intangible asset, especially in terms of innovation Andawei, (2001). The unique tacit knowledge of individuals is of immense value to the organization as a whole, and is the "wellspring of innovation" Andawei, (2001). Identification of the different types of knowledge available to an organization is the first step to understanding how to manage them. Therefore, KM is intrinsically linked to IC as revealed by Ricky and Eric (2010). There are many definitions of KM. However, an operational definition has been developed for the purposes of this research. KM is about the processes by which knowledge is created, captured, stored, shared, transferred, implemented, exploited and measured to meet the needs of an organization. These processes lead to the establishment of a knowledge-based organization. A thorough review of the relevant literature and discussions with targeted researchers in the field would suggest that the development of successful knowledge management programmes involve due cognizance of many factors. They involve 'hard' (e.g. technology) and 'soft' (e.g. people, culture, leadership).

2.7 BENEFITS OF KM TO THE CONSTRUCTION INDUSTRY

Knowledge management can add value to an organization in the following ways:

A. Faster Decision Making:

KM helps to improve the effectiveness of an organization by reducing decision making time and improving quality of decisions made (Verma, 2012). According (Verma, 2012) to KM and KM technologies help provide:

- * Lesser time will be spent gathering knowledge resource (this is because KM provides a medium for storing knowledge resources), and more time can be invested in creation and dissemination of knowledge.

B. Competitive advantage: Due to the high competition in the business environment, many organizations are harnessing their knowledge assets to provide unique competitive advantages (Gold et al., 2002). Companies are constantly capturing, analyzing, disseminating knowledge resources to guide their decision-making process (Wen, 2009). By adapting such insights and making more informed decision faster, organizations can outwit their competitor and provide better quality service to their customers

C. Innovation: The unique organizational knowledge derived from managing and analyzing knowledge resources can help organization deliver innovative products and services to the customers. This will help foster:

- * More informed and quality decision making
- * Better customer satisfaction (Birasnav, 2013)
- * Eventually improving sales and revenue generated from that good/service. (Birasnav, 2013)

2.8 TYPES OF KNOWLEDGE USED IN PROJECT CONSTRUCTION

In the modern economy, the knowledge that it is able to harness is the organizations competitive advantage. This competitive advantage is realized through the full utilization of information and data coupled with the harnessing of people's skills and ideas as well as their commitments and motivations. In the corporate context, knowledge is the product of organization and systematic reasoning applied to data and information. It is the outcome of learning that provides the organizations only sustainable competitive advantage. As such, knowledge is an essential asset that has become more important than land, labor or capital in today's economy. Isaacs; Whittaker; Schiano; Kamm, (2002). In general, there are two types of knowledge: tacit knowledge and explicit knowledge. Tacit knowledge is that stored in the brain of a person.

2.9 TYPES OF KNOWLEDGE MANAGEMENT AND ITS USAGE IN CONSTRUCTION ENVIRONMENT

2.9.1 EXPLICIT KNOWLEDGE

According to Kim, Suh and Hwang, (2003), Explicit knowledge is codified. It is stored in documents, databases, websites, emails and the like. It is knowledge that can be readily made available to others and transmitted or shared in the form of systematic and formal languages. Explicit knowledge comprises anything that can be codified, documented and archived. These include knowledge assets such as reports, memos, business plans, drawings, patents, trademarks, customer lists, methodologies, and the like. They represent an accumulation of the organization's experience kept in a form that can readily be accessed by interested parties and replicated if desired. In many organizations these knowledge assets are stored with the help of computers and information technology Kim; Suh; Hwang, (2003).

Explicit knowledge is not completely separate from tacit knowledge. On the other hand, the two are mutually complementary. Without tacit knowledge it will be difficult, if not impossible, to understand explicit knowledge. For example, a person without technical, mathematical or scientific knowledge (tacit knowledge) will have great difficulty understanding a highly complex mathematical formulation or chemical process flow diagram, although it may be readily available from the organizations library or databases (explicit knowledge) Kim, Suh and Hwang, (2003). The core and enabling knowledge in organizations are more than a pure competitive advantage. This organizational knowledge makes possible focused and collective action. But as important as organizational knowledge is organizational memory. A great deal of the knowledge of the organization is created and stored at individual level. They are in the heads of people and groups of people who work in the organization – the employees, managers and top executives Easterby-Smith, and Lyles. (2003). Figure 4 give a pictorial representation of the primary repositories of an organization's knowledge.

2.9.2 TACIT KNOWLEDGE

According to Jain, (2001) Tacit knowledge is personal. It is stored in the heads of

people. It is accumulated through study and experience. It is developed through the process of interaction with other people. Tacit knowledge grows through the practice of trial and error and the experience of success and failure. Tacit knowledge, therefore, is context-specific. It is difficult to formalize, record, or articulate. It includes subjective insights, intuitions and conjectures. As intuitive knowledge, it is difficult to communicate and articulate. Since tacit knowledge is highly individualized, the degree and facility by which it can be shared depends to a great extent on the ability and willingness of the person possessing it to convey it to others.

The sharing of tacit knowledge is a great challenge to many organizations. Tacit knowledge can be shared and communicated through various activities and mechanisms. Activities include conversations, workshops, on-the-job training and the like. Mechanisms include, among others, the use of information technology tools such as email, groupware, and instant messaging and related technologies (Jain, 2001). In managing tacit knowledge, the very first hurdle to most organizations is identifying the tacit knowledge that is useful to the organization. Once relevant tacit knowledge is identified, it becomes extremely valuable to the organization possessing it because it is a unique asset that is difficult for other organizations to replicate. According to Jain (2001) this very characteristic of being unique and hard to replicate is what makes tacit knowledge a basis of the organizations competitive advantage. Accordingly, it is essential for an organization to discover, propagate and utilize the tacit knowledge of its employees in order to optimize the use of its own intellectual capital. In any organization, tacit knowledge is the essential prerequisite for making good decisions. A new executive not yet familiar with the organization will find it difficult to make good decisions since he or she has yet to acquire tacit knowledge about the workings of the organization. Jain (2001) posited that Tacit knowledge is therefore crucial to getting things done and creating value for the organization. **Figure 4** gives a vivid illustration of these knowledge that resides in an organization.

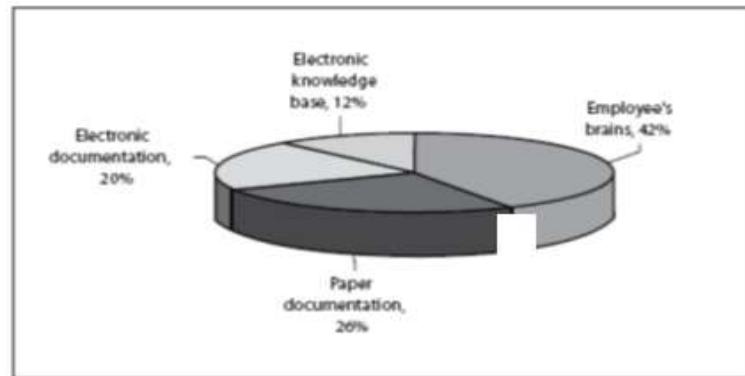


Figure 4: Primary Repositories of An Organization’s Knowledge (Easterby-Smith, (2003).

2.10 CLASSIFICATION AND EVALUATION OF EXISTING KNOWLEDGE MANAGEMENT TOOLS

In the following chapter, we will classify the existing tools for knowledge management and evaluate whether they are suitable for use in cooperative settings. It has to be noted that there is no such thing as “the knowledge management system” as a monolithic, integrated application. Instead, a knowledge management system is a more or less tightly integrated combination of various applications, some of which are used in other contexts as well.

2.11 CLASSIFICATION OF KNOWLEDGE MANAGEMENT TOOLS

King, (2005) there are numerous attempts at classifying software used in knowledge management in literature. In fact, almost every author uses his own classification, since the classification is usually closely linked to the subject treated and the insights desired. In the following, we will adapt the system proposed by Maier which classifies the IT tools based on the functions they serve in the knowledge management system. It is based on current research and covers all fields of technology used in practice. Besides, it is free from overlaps between categories. It offers a higher degree of clarity than categorizations which use only two categories based on dichotomies or strategies such as codification/ personalization. In this classification, the tools which are combined to form the knowledge management system are grouped into seven categories. These are the input-oriented functions of publication, structuring and linking as well as integration of knowledge from external sources. The output-oriented functions include search and retrieval as well as presentation of knowledge. These groups are supported by infrastructure functions categorized as communication/cooperation and administration. The seventh group, imparting knowledge, which

mainly consists of e-learning and related concepts, will not be examined in detail in this paper, as it mainly belongs to personnel development and not primarily to knowledge management King, (2005).

We will introduce the results in the form of tables and discuss the main results, including tools which are particularly well- or ill-suited for use in cooperation’s. Blank fields in the tables indicate that the criterion in question is not applicable to the respective tool. The + sign denotes that the tool in question complies with the requirement in question, the “O” means neutrality or limited support and means that the tool conflicts with the requirement. Since we will not be able to treat all tools in depth, we will focus on the aspects which are particularly positive or negative. King, (2005).

2.12 KNOWLEDGE MANAGEMENT PROCESSES

Systematic knowledge management process provides a clear guideline for organizations in the knowledge management implementation process, which includes: 1) Knowledge creation, 2) Knowledge gathering, 3) Knowledge organizing, 4) Knowledge diffusing, and 5) Knowledge using.

Knowledge creation involves developing new knowledge or replacing existing knowledge with new content Nonaka, (1994). According to Nonaka, there are four kinds of knowledge creation, which are socialization i.e. conversion of tacit knowledge to new tacit knowledge through social interactions and shared experiences; externalization i.e. converting tacit knowledge to new explicit knowledge; combination i.e. creating new explicit knowledge by merging, categorizing, and synthesizing existing explicit knowledge; and internalization i.e. creating new tacit knowledge from explicit knowledge Nonaka, (1994), Nonaka, (1995) & Takeuchi, (1995). Knowledge gathering is frequently the most mundane, most boring, least

understood, and consequently the most ignored aspect of knowledge management Stapleton, (2003). However, systematic gathering of information on customers and competitors is very important Ahn, (2005). It is stressed that every organization needs to identify where knowledge resides in the organization Bloodgood, (2001) & Salisbury, (2001), Syed-Ikhsan, (2004) & Rowland, (2004). As to facilitate the immediate searching, identification and learning of potentially valuable knowledge. Knowledge organizing is challenge for today's managers due to the tedious process of filtering and extracting relevant knowledge from the vast amounts of potential and actual information available from internal and external sources. Knowledge has to be structured in a format that is meaningful to the task at hand or is digestible to KM. The knowledge is to be gathered from different groups of knowledge worker and therefore it has to be arranged accordingly for easy access, thus the knowledge concerned "becomes a part of the organization's memory" King, (2008) & Chung, (2008). Knowledge diffusing helps to describe how to find, what to find, and where to find useful knowledge within the organization Soliman, (2000) & Spooner, (2000). The organization's head had to share it, or make certain that it was transferred to the appropriate knowledge workers, or those who would be affected by it Stapleton, (2003). Thus, in order for knowledge to have wide organizational impact, it must be diffused throughout the entire organization King,

(2005). Knowledge using is the systematic use of knowledge that will guide strategy recognition, understanding, creation, selection, implementation, and modification of products and services Ahn, (2005) Chang, (2005). Once knowledge is diffused, it may be use King, (2008) & Chung, (2008). In facilitating innovation, collective learning, individual learning, and/or collaborative problem-solving King, (2005).

2.13 DEVELOPING A KNOWLEDGE MANAGEMENT STRATEGY

A knowledge management strategy sets up a framework to assist with implementation process and provides a road map for the organization to follow and measure progress against. Like risk management the components of a knowledge management strategy can be divided into a number of interconnected steps. The figure 5 describes these interconnected steps. Figure 5 shows a pictorial representation of knowledge management processes studies so far.

2.13.1 IMPLEMENTING A KNOWLEDGE MANAGEMENT STRATEGY

Once you have decided to implement a knowledge management strategy it is useful to create a vision statement to define what you actually want to achieve. A vision statement should describe the overall aims of the strategy and set out the major supporting concepts that will be used to achieve it.

1. Create a vision – set the scope of the project. Establish the goals and objectives.
2. Form a project team.
3. Map the organisation.
4. Conduct a knowledge management audit.
5. Review the results – identify gaps.
6. Select pilot projects or identify health and safety or risk management initiatives.
7. Map knowledge needs.
8. Provide resources.
9. Connect across the organisation.
10. Review and continually improve.

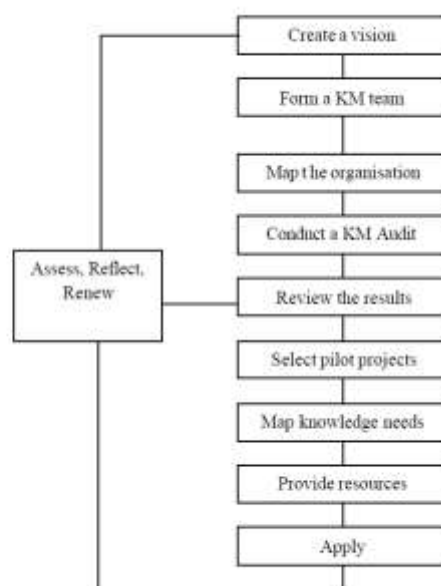


Figure 5: Knowledge Management Process (Parcell, (2001)

2.14 MAPING THE ORGANISATION

The next step in the process is to identify and document its current knowledge-based resources and capabilities. This is called mapping and it will identify what knowledge is currently available and how it is being used within the organization. Mapping the organization should clearly identify (Standards Australia, 2001).

(1) Where all of the business units within the organization are located. (2) What their main functions are (3) What are the main tasks undertaken in those areas. (4) Who are their key personnel in those areas? (5) What are their areas of expertise? (6) The organizational mapping can also include all all-major processes, technologies and equipment in risk management terms this is known as establishing the risk management context. (Standards Australia, 2001).

2.15 KNOWLEDGE MANAGEMENT AUDIT

Once the organization has been mapped an audit of each business unit or process should be conducted. This will determine how the organization is currently managing its knowledge management and risks knowledge. The audit should include what knowledge is available about controlling these knowledge management and risks and what knowledge should be collected, acquired or created. A knowledge management audit can reveal potential knowledge gaps in project practitioners. Several techniques can be used to collect data such as questionnaires, focus groups and critical incident technique (Standards Australia 2001, p 5).

2.16 KNOWLEDGE MANAGEMENT TOOLS

The development of IT for organizations has produced many successful ERP-type systems that manage well-defined processes. But systems to manage ill-defined, knowledge intensive processes have met with less success. KM practitioners use a wide range of IT tools to share, create, codify, and share knowledge. The trend in the development of IT for organizations is toward more communication and collaboration tools. Melville; Mooney; Nagarajan (2001).

2.17 REQUIREMENT OF KNOWLEDGE MANAGEMENT TOOLS

According to Miller, Ron (2005): The tools for KM are focused on assimilation, comprehension, and learning of the information by individuals who will then transform data and information into knowledge. Knowledge is strictly linked and connected to the individual (or group) who creates it, which may cast doubts on the

availability of information systems tools to effectively support KM. Thus, the visible part of knowledge, what the literature calls explicit as opposed to the tacit dimension of knowledge, is only information regardless of the amount of the other individual knowledge embedded into its Butterworth-Heinemann, Burlington, (2003). Therefore, there is requirement of KM tools, which can collect, catalogue, organize, and share knowledge or transfer information (the explicit knowledge) embedded in various forms and types of documents and media. These reasons are: -

(i) Facilitate information contextualization: To facilitate information contextualization, metadata on its characteristics and integration within a specific environment must be attached to it before storing. This facilitates better retrieval and management for the knowledge seeker. Miller and Ron (2005).

(ii) Intelligently transfer information:

Information transfer must occur by taking into account the user, the content, and the time of transfer. A tool that can optimize these three aspects can truly provide information according to the needs of the users, respecting one of the key functional foundations of KM.

(iii) Facilitate social interactions and networking:

Direct communication and verbal knowledge transfer through social interactions among individuals is the most natural aspect of knowledge sharing. A KM tool supports this social aspect and facilitates searching.

(iv) Present a customized human-computer interface:

The tools also support interface customization and ease of use. The human-computer interface, ease of use and usability will drive intention to use and reuse the tools. (Butterworth-Heinemann, Burlington, 2003).

2.17 TOOLS AVAILABLE FOR KNOWLEDGE MANAGEMENT

A number of tools are available to support the functionalities and processes of KM, which are listed below:

(i) Tools to access knowledge: These tools provide access to explicit knowledge that can be shared and transferred through the enterprise information systems. For example, Convera is a tool used for retrieval ware. It works on powerful indexing systems to classify expertise based on both content and collaboration dynamics and networks within the enterprise.

(ii) Tools for semantic mapping: These tools are meant to quickly support presentation of information, analysis, and decision making.

Ontology tools are also part of this category as they enable users to organize information and knowledge by groups and schemata that represent the organizational knowledge base. For example, Anacubis is a ground-breaking visual research and analysis software for corporate researchers, analysts, and intelligence professionals. It supports the visual discovery and analysis of intelligence in both online and enterprise information. Information is represented in the Anacubis Desktop by icons and links. Users can also import, create, analyse, and distribute visual representations of their research and analysis.

(iii) Tools for knowledge extraction: These tools support structured queries and replies. They help mining text by interpreting relationships among different elements and documents. For example, Clear Forest Text Analysis Suite is an advanced text driven business intelligence solution which apply intelligent mark-up to key entities such as person, organization, location, as well as detailed facts or events embedded within free-form text such as news articles, web surveys, and HTML documents.

(iv) Tools for expertise localization: These tools enable quick location of the knowledge holders in the enterprise and facilitate collaboration and knowledge exchange. For example, Active Net maintains a continuous, real-time view of organizational activities. Active Net continuously discovers each person's work activity and business relationships by processing communications from such sources as documents, discussion databases, e-mail, instant messaging and digital workspaces.

(v) Tools for collaboration work: These tools enable teams to globally share dedicated spaces for managing the project lifecycle; editing and publishing materials; conducting live discussions and interactions; and maintaining a repository of materials associated with every step of the process. For example, Quick Place is a Lotus web-based shared workspace software for real time collaboration among geographically dispersed participants. Using Quick Place, co-workers, suppliers, partners, and customers can communicate online immediately within a structured workspace created for that purpose. An online workspace can make it possible for people to work together more easily and less expensively.

2.18 KNOWLEDGE MANAGEMENT SYSTEMS

A knowledge management system is the technology platform and infrastructure that an organization employs to support knowledge management (Robinson et al, 2010). It typically

consists of a set of tools, made up of technologies (IT Tools) and techniques (non-IT tools). Both technologies and techniques are equally important to support different KM processes (Anumba et al, 2005) and are briefly described below.

2.19 KM TECHNOLOGIES IN CONSTRUCTION INDUSTRIES

KM technologies rely on an IT infrastructure. Examples of KM technologies for capturing knowledge are: Knowledge Mapping Tools, Knowledge Bases, and Case Based Reasoning. Although there is a debate about the degree of importance of such technologies, many organizations consider these important enablers that support the implementation of a KM strategy (Skyrme and Amidon, 1997; Kanter, 1999; Anumba et al, 2000; Egbu, 2000; Storey and Barnett, 2000) as they consume one third of the time, effort and money required for a KM system. The other two-thirds mainly relate to people and organizational culture (Davenport & Prusak, 1998; Tiwana, 2000).

KM technologies consist of a combination of hardware and software technologies. Hardware technologies and components are important for a KM system as they form the platform for software technologies to perform and are the medium for storage and transfer of knowledge. Some of the hardware requirements of a KM system include personal computers or workstations to facilitate access to knowledge, powerful servers to allow the organization to be networked, open architecture to ensure interoperability in distributed environments, media-rich applications requiring Integrated Services Digital Network (ISDN) and fibre optics to provide high speed and use of the public networks (e.g. Internet) and private networks (e.g. Intranet, Extranet) to facilitate access to and sharing of knowledge (Lucca et al, 2000). Software technologies play an important part in facilitating the implementation of KM. The number of software applications has increased considerably in the last few years. Solutions provided by software vendors take many forms and perform different tasks. The large number of vendors that provide KM solutions makes it extremely difficult to identify the most appropriate solutions. This has resulted in organizations adopting different models for establishing KM systems. Tsui (2002) identifies five emerging models for deploying organizational KM systems where one or a combination may be adopted: customized off-the-shelf, in-house development, solution re-engineering, knowledge services, and knowledge marketplace. KM Techniques KM techniques do not depend on IT

although they provide support in some cases. Knowledge sharing, for example, is a sub-process of KM, which can take place through face-to-face meetings, recruitment, apprenticeships, mentoring, and training. The importance of KM techniques comes from several factors. Firstly, KM techniques are affordable to most organizations as no sophisticated infrastructure is required. Some techniques, however, require more resources than others (for instance training requires more resources than face-to-face interactions). Secondly, KM techniques are easy to implement and maintain due to their simple and straightforward nature. Thirdly, KM techniques focus on retaining and increasing the organizational tacit knowledge, a key asset to organizations. KM techniques are not new; most organizations have been implementing these for a long time under the umbrella of management approaches such as organizational learning and learning organizations. Using these tools for the management of organizational knowledge requires their use to be enhanced so that benefits, in terms of knowledge gain/increase, can be fully realized. Examples of KM techniques include brainstorming, communities of practice (CoPs), face-to-face interactions, post-project reviews, recruitment, mentoring, apprenticeship and training.

III. RESEARCH METHODOLOGY

STUDY AREA The research study emphasis on the immense advantages that accrues a national professionalism on adoption of knowledge management among construction practitioners as a vital tool for construction project delivery in domicile of Niger Delta Region, South –South Zone of Nigeria. The South –South Zone (SSZ), an exceptional one that makes up to the two-thirds of the entire coastal area of Nigeria. The states in the southern zone are Abia, Akwa-Ibom, Cross River, Bayelsa, Delta, Edo, Imo, River State, Ondo. (UNDP 2006). A terrine blessed with minarel resources Petroleum, Cocoa and forestry reserve.

RESEARCH DESIGN The design of the research involved the following procedures: Pilot Questionnaire Sample / data Selection, Questionnaire design and Method of analysis. **Pilot questionnaire** A pilot survey is a strategy used to test the questionnaire using a smaller sample compared to the planed sample size. In this phase of conducting a survey, the questionnaire is administered to a percentage of the total sample population, or in more informal cases just to a convenience sample. **Sample/Data collection**, this research will make use of both the primary and secondary sources of data respectively to get

information in the process of carrying out this research. Primary source of data has to do with that useful information gathered from the field which includes result from questionnaire, observation interview, focus group discussions and selected reports of evaluating and implementing knowledge management (KM) among construction practitioners conducted in difference regions. Secondary source of information includes all published peer-reviewed journal articles and reports. By using questionnaire surveys, the research will formulate some questions and distribute to respondents, expected to complete and return them back to the research team. The research team will place more reliance on the method because the researcher will obtain information that ordinarily could not have been afforded by the research team and also extract views from other persons on the study. Information collected through the structured questionnaires will represent the primary data. In analyzing this research, the descriptive and inferential statistical method (like pie chart, frequency table, graphs, etc.) is been used in order to translate the data collected into Useful information and to summarize them for proper use in decision making. Survey Monkey will be used as a tool in formulating the questionnaire and distributing to respondents via email to the target audience, and will also be used to analyze the data received from respondents.

IV. RESULTS AND DISCUSSION

Data were analyzed using survey monkey and analysis were done with the same software. Scores for each question entered and feedbacks from 115 respondents were mathematically analyzed. Kruskal Wallis Test conducted to test the assumption that attitude of the adoption of KM in the various construction company located in Nigeria. KM has a greater impact on technology adoption than Lack of IT physical components. The results demonstrated that the participant had varying degrees of awareness of the KM concept and its benefits. As notice from their accounts, some practitioners had difficulties in separating the concept of KM from information management. The difficulties associated with distinguishing these two concepts were not peculiar to just construction practitioners in Nigeria, and the reasons for the lack of clarity might not be farfetched because attempts have been made to classify the two as being interchangeable (Hicks et al, 2006). The findings also established that there is now a growing awareness of the potentials benefits of KM in the Nigerian construction industry. Using different expressions, the participants had identified

improved project delivery, improved performance and innovation, risk minimization and financial gains, organizations' increased capacities to win new projects and the seamless transfer of knowledge across project/organization boundaries to be among the main benefits of KM deployment. The account of the interviewees was closely related to the results of Zin and Egbu (2010), Anumba (2005), Egbu (2004) and Robinson et al (2001), who previously explored the benefits of KM. Also, KMPG (1998), survey concluded that KM leads to better decision making, faster, response time to key issues, improved productivity, creation of new/additional business opportunities, reduced costs, better sharing of best practices, increased market share and share price, and improved staff attraction and retention. Though the results from this paper gives a list of additional benefits of KM, Clark and Soliman (1999) posited that there are other benefits that are not tangible and cannot be readily classified. However, the high points of the findings demonstrated that practitioners in the Nigerian construction industry were aware of KM benefits and this justified the need for its logical deployment in their current and future activities (Zuofa and Ochieng, 2013).

Of all the factors identified, some of the accounts of the participants indicated that what seemed to be the most crucial were those factors closely related to their organizations, leadership and personnel. For instance, participant F suggested that, 'even as our management may acknowledge the need for improved KM, they still do not understand what it actually is and how to

implement it'. Another participant retorted that 'the type of philosophy in any organization will determine how knowledge is managed. If people are not given to sharing knowledge how can the one, they have been ever documented not to mention being shared'. Although the factors affecting KM deployment appeared numerous, for the purpose of this paper these factors were classified under three major categories: the individual/personnel, the organization and technology/information categories. The choice of these categories was a result of the convergence of the identified factors to these classifications in terms of their characteristics. What the participants' accounts and past studies on factors affecting KM in the construction industry (example Carrillo et al., 2004; Davenport et al., 1998; Egbu et al., 2001) may possibly suggest is that irrespective of geographical location, KM in the construction industry may be affected by similar factors. The outcome of this test reveals that there is no significant gap/impact between two barrier categories since Barrier attitude ranked only one percent over barrier IT infrastructure. See Figure 22, Table 11 and 12. RII was used to rank range of barriers, check the correlation between various variables from respondent and classify the most critical Barrier factors these Universities are experiencing. Research has it that researchers such as Cohen (2013); Heejun, Vincent, and Williams (2004), adopted RII in their research to demonstrate the significance of effective knowledge management execution in an organization setting.

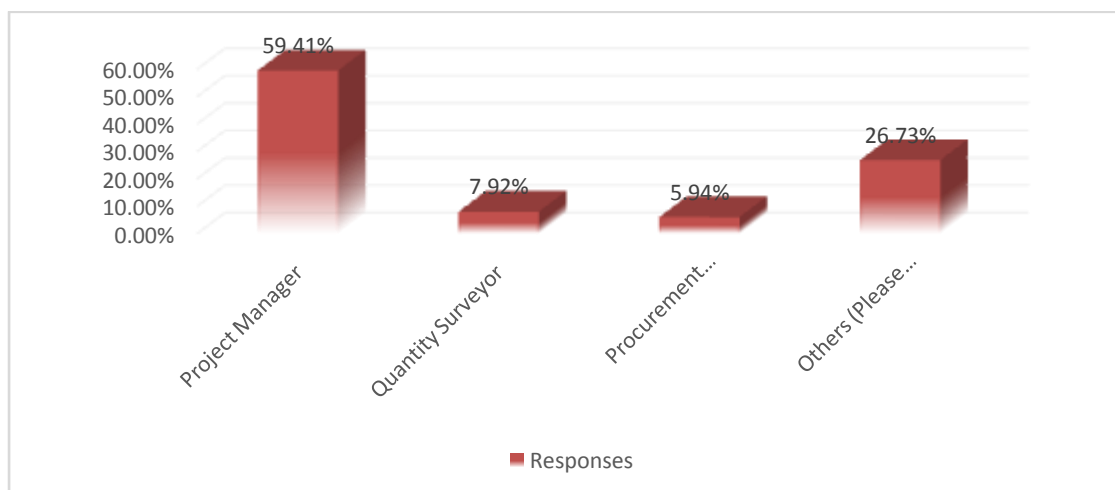


Figure 6: Respondent Professional Roles

Table 1: Respondent Professional Role

Answer Choices	Percentage	Frequency
Project Manager	59.41%	60
Quantity Surveyor	7.92%	8
Procurement Personnel/officer	5.94%	6
Others (please specify)	26.73%	27
	Answered	101

RESULTS INTERPRETATION:

Table 1 and figure 6 show the distribution of respondents’ professional roles in which 6 respondents (5.94%) choose Procurement

Personnel/officer, 8 respondents (7.92%) choose Quantity Surveyor and 27 respondents (26.73%) choose others while 60 respondents (59.41%) choose project manager.

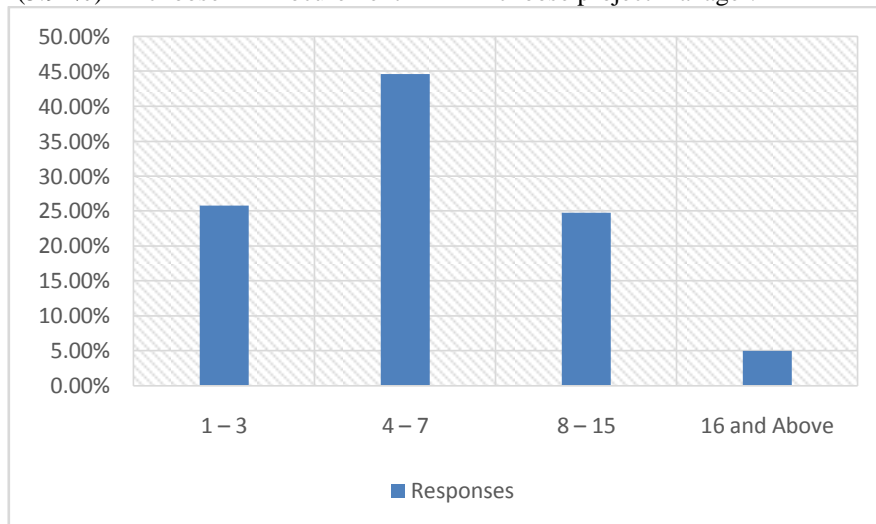


Figure 6: Respondent Numbers of Years Worked in This Role

Table 1: 2 Respondent Numbers of Years Worked in this Role

Answer Choices	Percentage	Frequency
1 – 3	25.74	26
4 – 7	44.55	45
8 – 15	24.75	25
16 and Above	4.95	5
	Answered	101

INTERPRETATION

Table 2 and figure 7 shows the distribution of respondents by how long they have worked in that role in a particular industry in which 45 respondents (44.55%) agreed to work in that role for 4-7 years, 26 respondents (25.74%) agreed

to work for 1-3 years and 25 respondents (24.75%) agreed to work for 8-15 years while 5 respondents (4.95%) agreed to work for 15 and above. Is showing that there is a high number of persons that have work for 4-7 years?

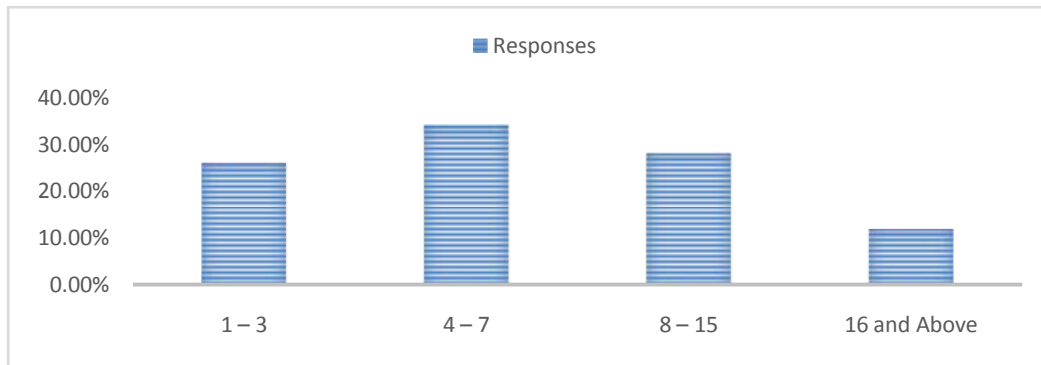


Figure 7: Respondent Numbers of Years Worked In The Nigerian Construction Industry

Table 2: Respondent Numbers of Years Worked in The Nigerian Construction Industry

Answer Choices	Percentage	Frequency
1 – 3	26.00%	26
4 – 7	34.00%	34
8 – 15	28.00%	28
16 and Above	12.00%	12
	Answered	100

RESULTS INTERPRETATION

Table 3 and figure 8 show the distribution of respondents on how long they have work in the Nigerian construction industry in which 34 respondents (34.00%) agreed to work in that role for 4-7 years, 28 respondents (28.00%) agreed to

work for 8-15 years and 26 respondents (26.00%) agreed to work for 1-3 years while 12 respondents (12.00%) agreed to work for 16 and above. It is showing that there are a high number of persons who have work for 4-7 years

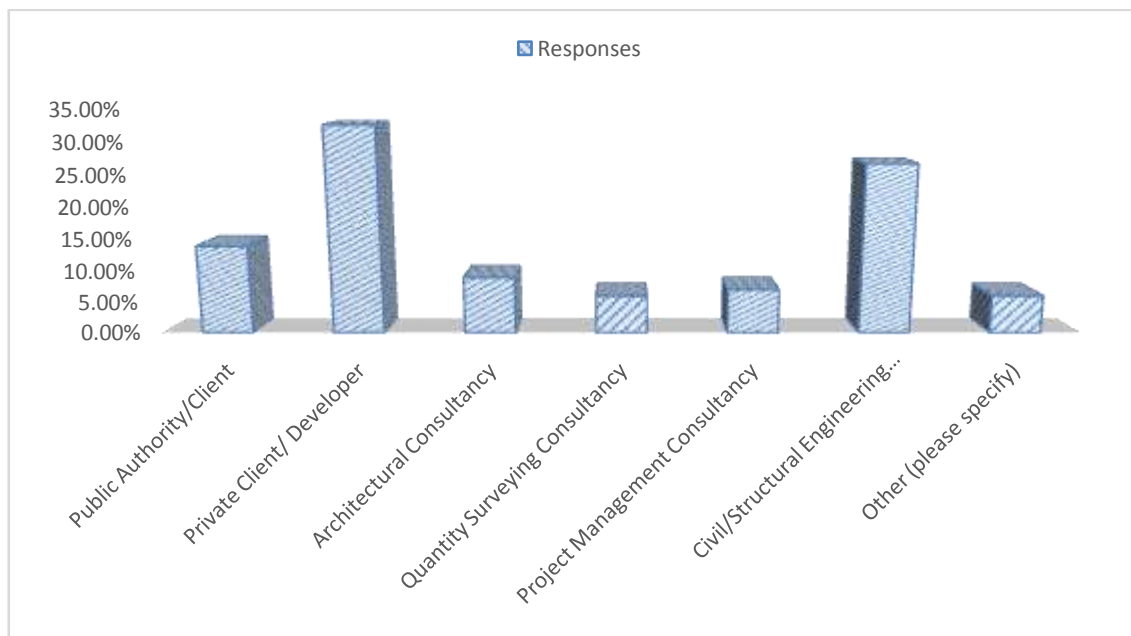


Figure 8: Respondent Main Designation of Their Employer

Table 3: Respondent Main Designation of Their Employer

Answer Choices	Percentage	Frequency
Public Authority/Client	13.73%	14
Private Client/ Developer	32.35%	33
Architectural Consultancy	8.82%	9
Quantity Surveying Consultancy	5.88%	6
Project Management Consultancy	6.86%	7
Civil/Structural Engineering Consultancy	26.47%	27
Other (please specify)	5.88%	6
	Answered	102

INTERPRETATION

Table 4 and figure 9 show the distribution of respondents showing the designation of their employer in which 34 respondents (34.00%) agreed to work in that role for 4-7 years, 28 respondents

(28.00%) agreed to work for 8-15 years and 26 respondents (26.00%) agreed to work or 1-3 years while 12 respondents (12.00%) agreed to work for 16 and above. Is showing that there is a high number of persons who have work for 4-7 years

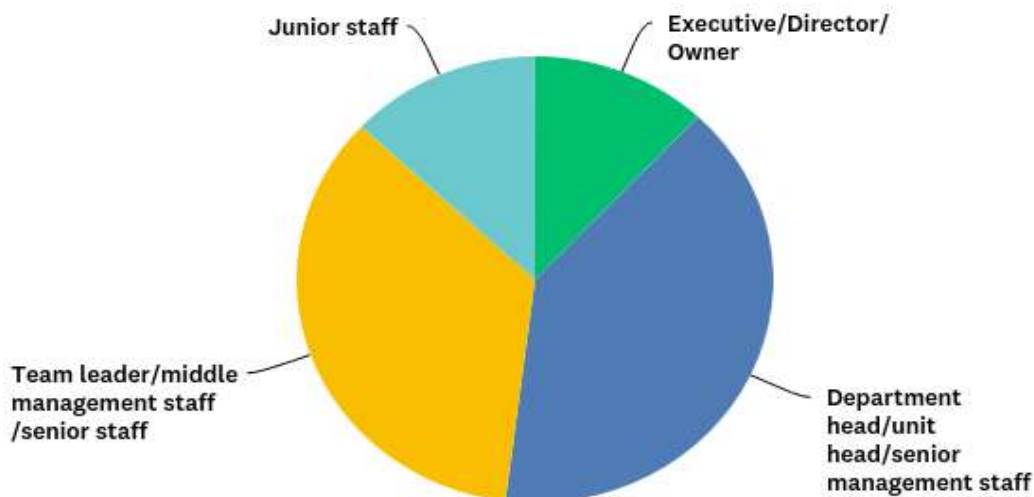


Figure 9: Respondent Position Within Their Employing Organization

Table 4: Respondent Position Within Their Employing Organization

Answer Choices	Percentage	Frequency
Executive/Director/Owner	12.00%	12
Department head/unit head/senior management staff	40.00%	40
Team leader/middle management staff /senior staff	35.00%	35
Junior staff	13.00%	13
	Answered	100

INTERPRETATION:

Table 5 of Figure 10 the result above shows the respondent position within their organization 40 (40.00%) of respondent choose Department head/unit head/senior management staff, 35 (35.00%) of respondent choose Team

leader/middle management staff /senior staff and 13 (13.00%) of respondent select Junior staff while 12(12.00%) of the respondent are Executive/Director/Owner and two skipped the question.

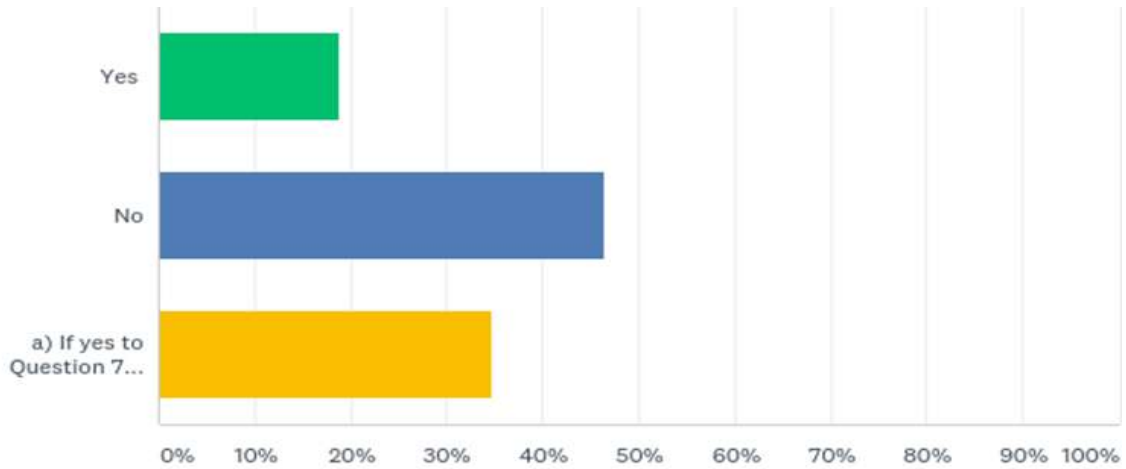


Figure 10: Various Members of Professional Bodies

Table 5: Member of Professional Body/bodies

Answer Choices	Percentage	Frequency
Yes	18.81%	19
No	46.53%	47
a) If yes to Question 7 please specify the professional institution(s) and grade of membership if any:	34.65%	35
	Answered	101

RESULTS INTERPRETATION:

The result in Figure 11 and table 6 shows that 47 (46.53%) do not agreed to be member of professional body and 19(18.88%) of the

respondent agreed to be member of professional body while 35(34.65%) say yes to be member of a professional body not listed above

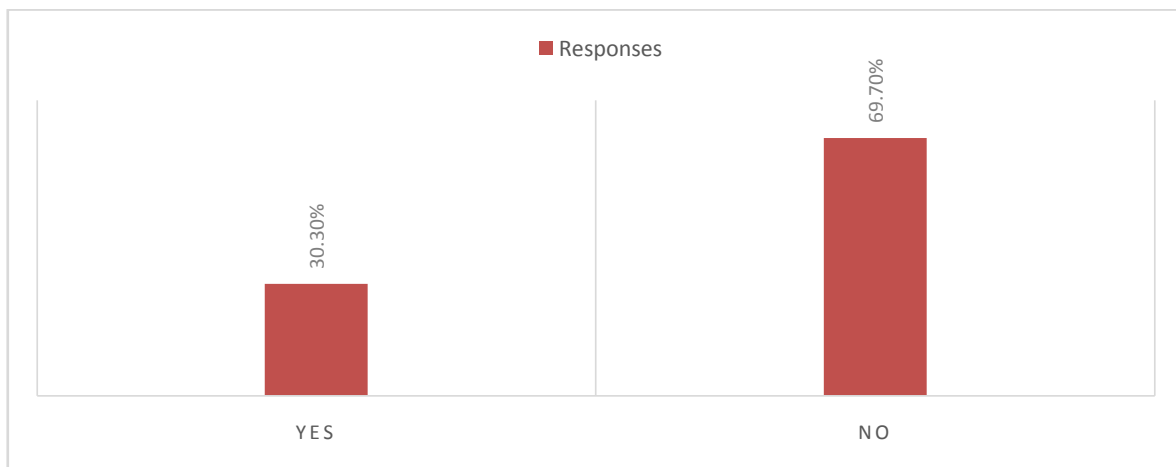


Figure 11: Respondent That Has Undertaken Continuous Professional Development (CPD) Training Relating to Knowledge Management (KM) Among Construction Practitioners Within The Past Five Years.

Table 6: Respondent that have undertaken continuous professional development (CPD) training relating to Knowledge Management (KM) among construction practitioners within the past five years

Answer Choices	Percentage	Frequency
Yes	30.30%	30
No	69.70%	69
	Answered	99

RESULT INTERPRETATION:

The result Figure 12 and Table 7 shows that 33(30.30%) of respondent choose to have undertaken a training relating to Knowledge

management. while 69(69.70%) respondent have not taken any training relating to Knowledge management (KM).

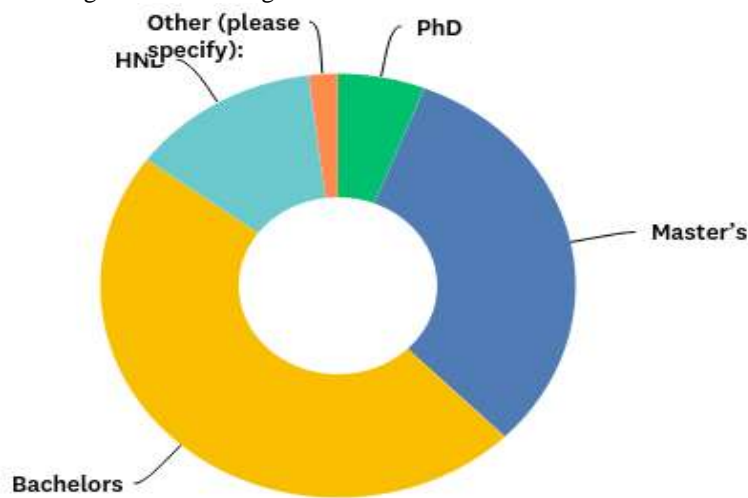


Figure 12: Respondent Highest Level Of Construction Related Education

Table 7: Respondent Highest Level of Construction Related Education

Answer Choices	Percentage	Frequency
PhD	5.94%	6
Master's	31.68%	32
Bachelors	47.54%	48
HND	12.87%	13
Other (please specify):	1.98%	2
	Answered	101

INTERPRETATION OF RESULTS

Table 8 Figure 13 the result above show their highest level of construction related education that 6(5.94%) of respondent choose PhD, 32

(31.68%) choose mater`s 48 (47.54%) choose Bachelors 13(12.87%) choose HND and 2(1.98) choose other.

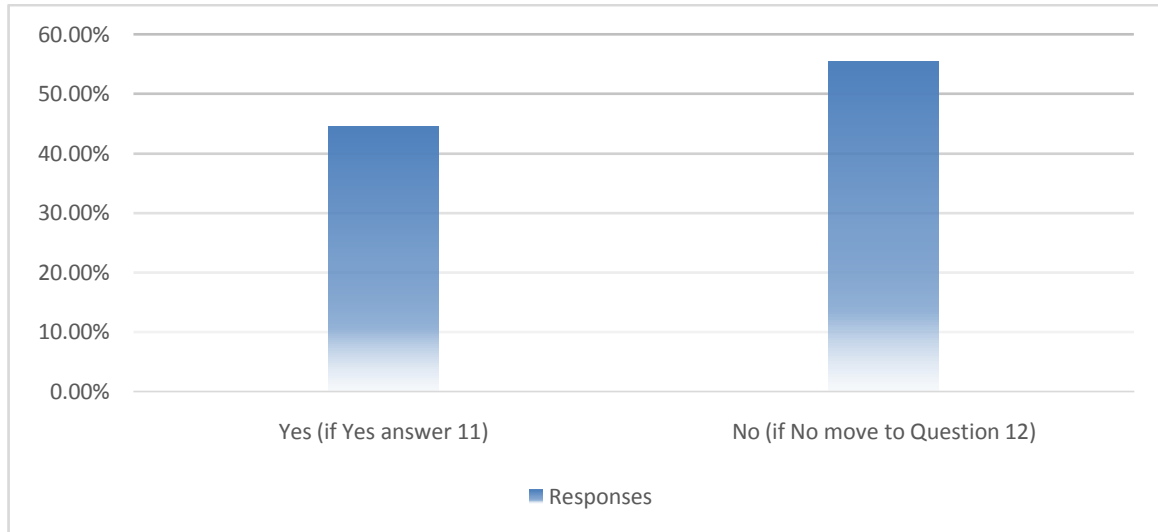


Figure 13: Respondent Lessons Received Relating To Knowledge Management (KM) Among Construction Practitioners In Their Formal Construction Education

Table 8: Respondent Lessons Received Relating to Knowledge Management (Km) Among Construction Practitioners in Their Formal Construction Education

Answer Choice	Percentage	Frequency
Yes (if Yes answer 11)	44.55%	45
No (if No move to Question 12)	55.45%	56
	Answered	101

INTERPRETATION

Table 9 figure 14 above the result shows those who receive lessons relating to Knowledge Management (KM) among construction

practitioners as a case study in their formal construction education that 45(44.55%) of respondent say yes and 56 (55.45%) do not regard it.

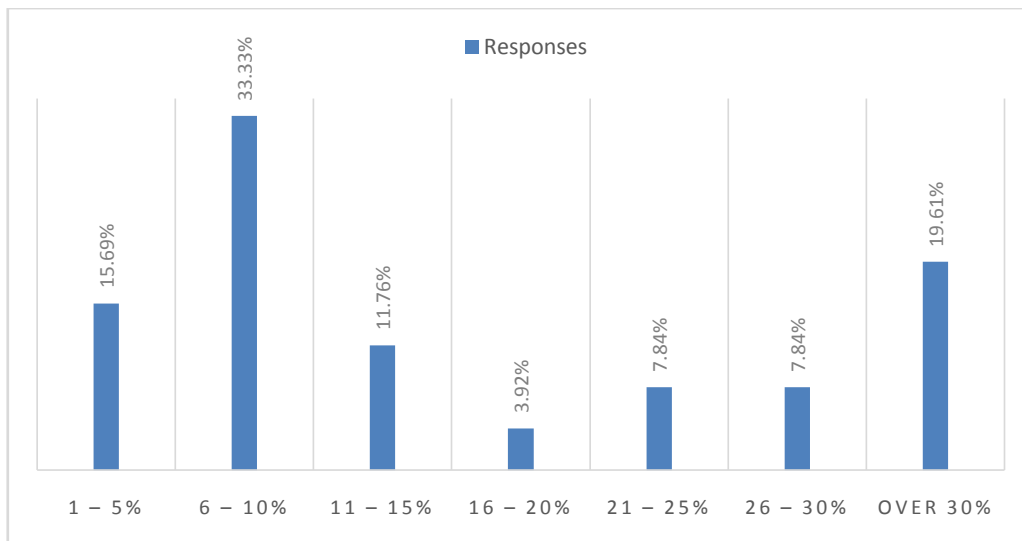


Figure 14: Respondent Percentage of The Content of Their Formal Education Related Specifically to Knowledge Management (KM) Among Construction Practitioners as Case Studies

Table 9: Respondent Percentage of The Content of Their Formal Education Related Specifically to Knowledge Management (KM) Among Construction Practitioners as Case Studies

Answer Choices	Percentage	Frequency
1 – 5%	15.69%	8
6 – 10%	33.33%	17
11 – 15%	11.76%	6
16 – 20%	3.92%	2
21 – 25%	7.84%	4
26 – 30%	7.84%	4
Over 30%	19.61%	10
	Answered	51

INTERPRETATION

Table 10 figure 15 above extracted responses showing percentage of the content of their formal education related specifically to Knowledge Management (KM) among construction practitioners as case studies. In this case 8 (15.69%) respondents agreed 1-5% years,

17(33.3%) respondents agreed 6-10% years, 6(11.76%) respondents agreed 11-15% years, 2(3.92%) respondents agreed 16-20% years, 4(7.84%) agreed 21-25% years, 4(7.84%) agreed 26-30% years, 10(19.61%) respondents agreed over 30% years.

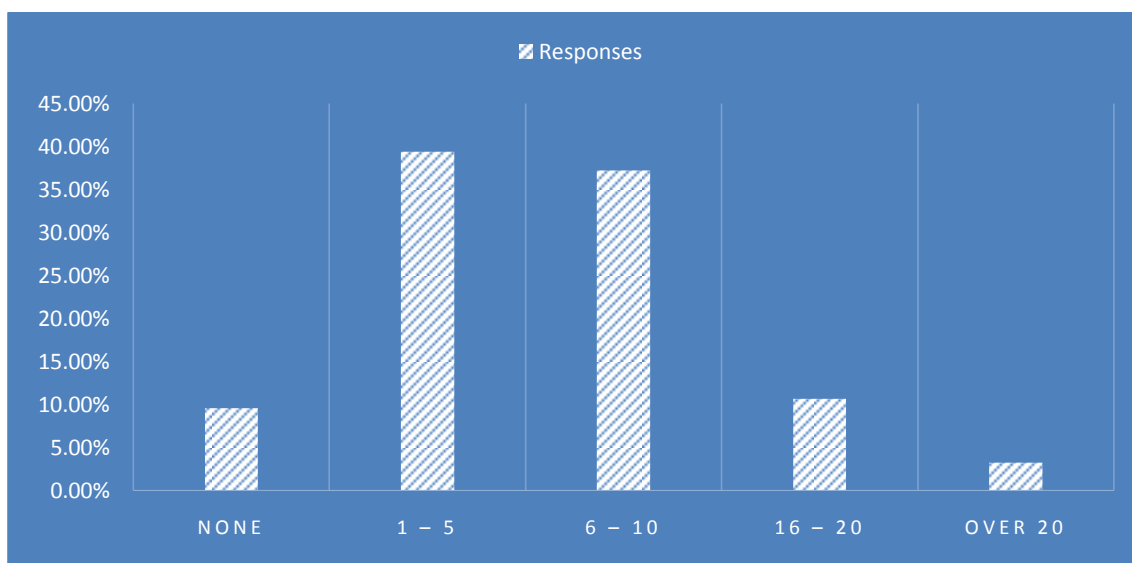


Figure 15: Respondent Number of Construction Projects They Have Been Directly Involved In Their Contractor Tendering Exercise (Where Direct Involvement Is Either Preparing The Tender Documentation Or Evaluating The Tenders).

Table 10: Respondent Number of Construction Projects They Have Been Directly Involved In Their Contractor Tendering Exercise (Where Direct Involvement Is Either Preparing The Tender Documentation Or Evaluating The Tenders)

Answer Choices	Percentage	Frequency
None	9.57%	9
1 – 5	39.36%	37
6 – 10	37.23%	35
16 – 20	10.64%	10
Over 20	3.19%	3

	Answered	94
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RESULT INTERPRETATION:

Table 11 figure 16 above extracted responses shows their past three years, how many construction projects they have been directly involved in the contractor tendering exercise

(where direct involvement is either preparing the tender documentation or evaluating the tenders 9 of (9.57%) respond none 37(39.36%) agreed 1-5, 35(37.23%) agreed 6-10, 10 (10.64%) agreed 16-20, and 3(3.19%) says respond over 20.

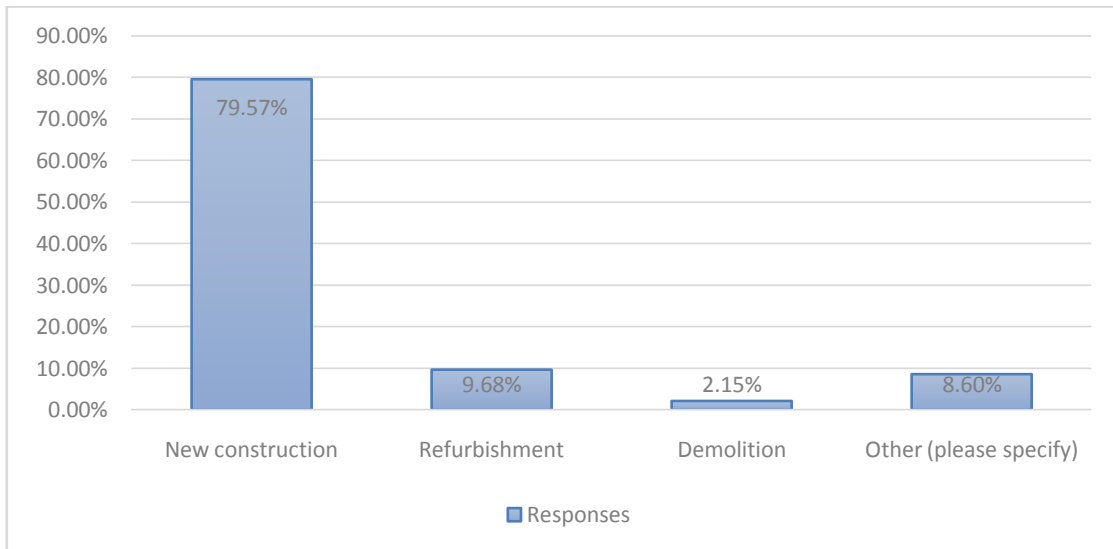


Figure 16: Respondents Most Common Nature of The Projects

Table 11: Respondent Most Common Natures of The Projects

Answer Choices	Percentage	Frequency
New construction	79.57%	74
Refurbishment	9.68%	9
Demolition	2.15%	2
Other (please specify)	8.60%	8
	Answered	93
	Skipped	9

RESULTS INTERPRETATION:

Table 12 Figure 17 above extracted responses on the most common nature of the projects handle by the respondent 74(79.57%)

respondents says it is new construction, 9(9.68%) respondents agreed to refurbishment, 2(2.15%) respondents says it is demolition, and 8(8.60%) respondents says is others.

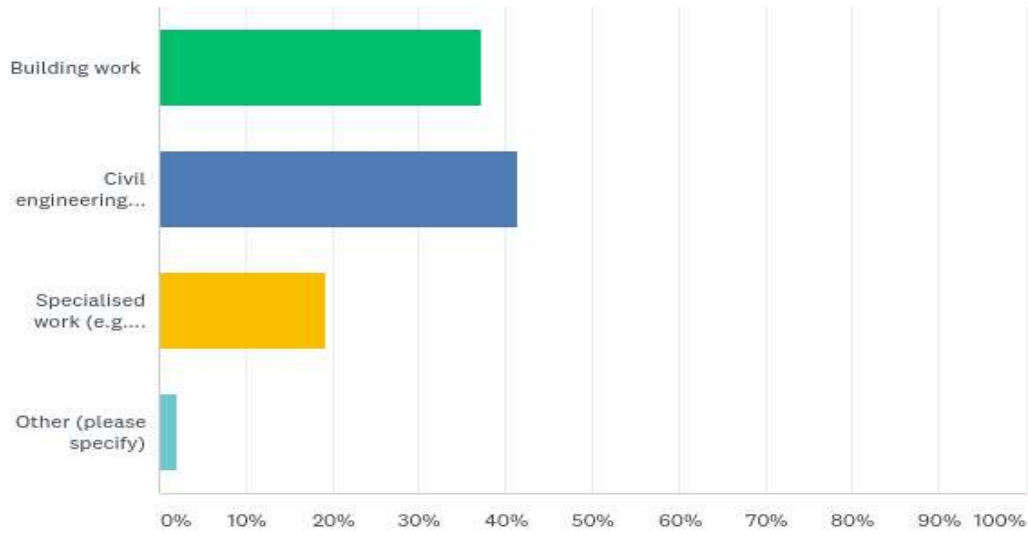


Figure 17: Respondents Most Common Type of The Projects

Table 12: Respondent Most Common Type of The Projects

Answer Choices	Percentage	Frequency
Building work	37.23	35
Civil engineering work	41.49	39
Specialised work (e.g. mechanical, electrical & plumbing work)	19.15	18
Other (please specify)	2.13	2
	Answered	94

RESULTS INTERPRETATION

Table 13 figure 18 above extracted responses showing percentage of the content of their most common type of the project they have handle in this case 35 (37.23%) respondents rate

Building work, 39(41.49%) respondents rate civil engineering work, 18(19.15%) respondents agreed Specialized work (e.g. mechanical, electrical & plumbing work), 2(2.13%) respondents rate others.

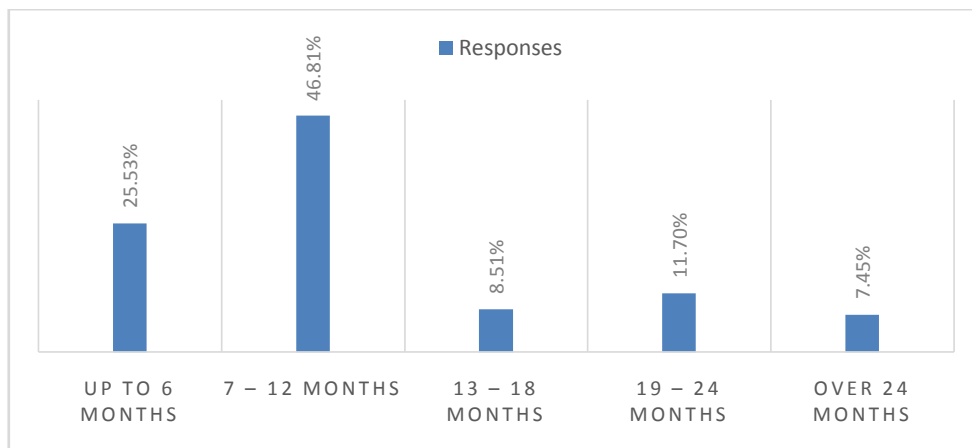


Figure 18: Respondent Most Common Range of Duration of The Projects

Table 13: Respondent Most Common Range of Duration of The Projects

Answer Choices	Percentage	Frequency
Up to 6 months	25.53%	24
7 – 12 months	46.81%	44
13 – 18 months	8.51%	8
19 – 24 months	11.70%	11
Over 24 months	7.45%	7
	Answered	94

RESULTS INTERPRETATION:

Table 14 Figure 19 extracted responses showing percentage of the content of their most common range of duration of the project they have handle 24 (25.53%) respondents agreed up to 6

months, 44(46.81%) respondents’ rate 7-12 months, 8(8.51%) respondents agreed 13-18 months 11(11.70%) respondents agreed 19-24, 7(7.45%) respondents rate over 24 months.

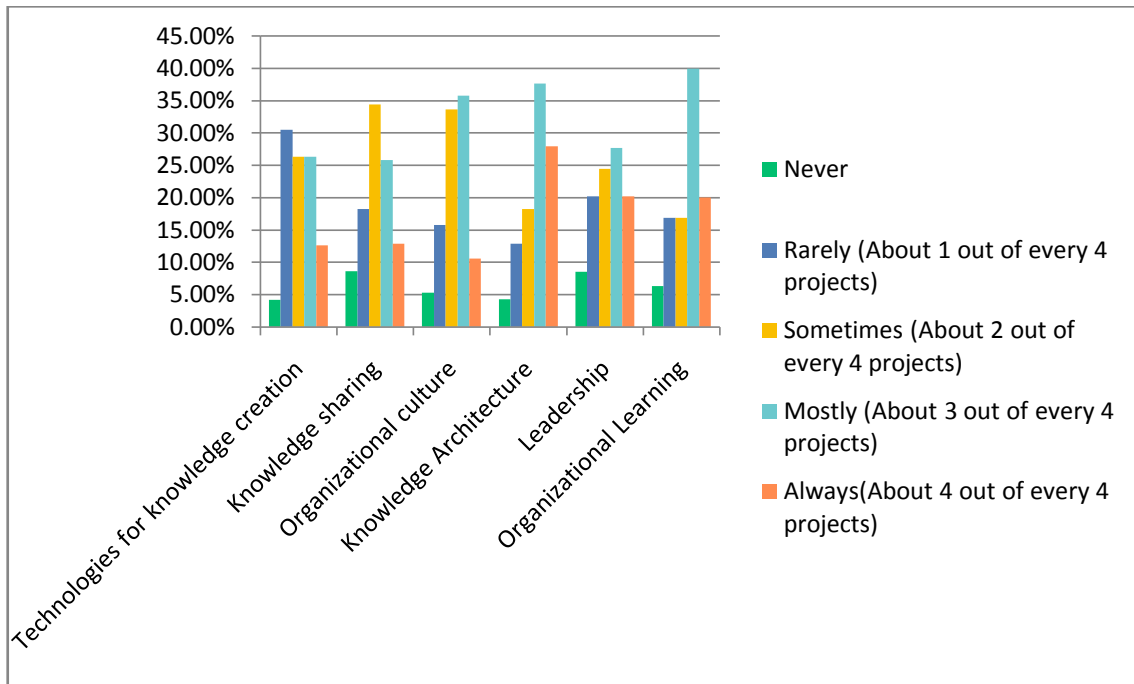


Figure 19: Respondent Number of Times The Following Information Was Been Acknowledge In The Construction Company

Table 14: Respondent Number of Times the Following Information Was Been Acknowledge in The Construction Company

Answer choices	Never	Rarely (About 1 out of every 4 projects)	Sometimes (About 2 out of every 4 projects)	Mostly (About 3 out of every 4 projects)	Always (About 4 of every 4 projects)	Total

	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	
Technologies for Knowledge Creation	4.21%	4	30.53%	29	26.32%	25	26.32%	25	12.63%	12	95
Knowledge Sharing	8.60%	8	18.28%	17	34.41%	32	25.81%	24	12.90%	12	93
Organizational Culture	5.26%	5	15.79%	15	33.68%	32	35.79%	34	10.53%	10	95
Knowledge Architecture	4.30%	4	12.90%	12	18.28%	17	37.63%	35	27.96%	26	93
Leadership	8.51%	8	20.21%	19	24.47%	23	27.66%	26	20.21%	19	94
Organizational Learning	6.32%	6	16.84%	16	16.84%	16	40.00%	38	20.00%	19	95
Answered											95

RESULTS INTERPRETATION

Technologies for Knowledge Creation: Analysis from respondents reveals that (4.21%) never request for the deliverable, (30.53%) Rarely request for this information, (26.32%) sometimes and mostly request for this information while (12.36%) always require for this information. It is clear to see that the highest percentage of the respondent rarely request for this deliverable while the never category has lower percentage of the respondents. Table 15 and Figure 20 gives a clear description of the

As regard Knowledge Sharing: The data collected from the respondents show that (8.60%)

never request for the information, (18.28%) rarely request for this information, (34.41%) sometime request for this information, (25.81%) mostly request for the deliverable, while (12.90%) always request for the information. Is shown clear that the highest percentage of the respondent sometime request for this information while the never category has lower percentage of the respondent.

ForOrganizational Culture: A careful look at this analysis reveals that (5.26%) never request for the deliverable, (15.79%) rarely request for this information, (33.68%) sometime request for this information, (35.79%) mostly request for the deliverable, while (10.53%) always request for the

information. It is clear that the highest percentage of the respondent mostly request for this information while the never category has lowest percentage of the respondent.

As regards Knowledge Architecture: Analysis from respondents reveals that (4.30%) never request for the deliverable, (12.90%) Rarely request for this information, (18.28%) sometimes request for this information, (37.63%) mostly request for the deliverable, while (27.96%) always require for this information. It is clear to see that the highest percentage of the respondent mostly request for this deliverable while the never category has lower percentage of the respondents.

However, a careful looks at the analysis of responses, with regard to Leadership reveal that (8.51%) never request for the deliverable, (20.21%)

rarely and always request for this information, (24.47%) sometime request for this information, while (27.66%) mostly request for the deliverable, It is clear that the highest percentage of the respondent mostly request for this information while the never category has lowest percentage of the respondent.

For Organizational Learning: the data collected reveals (6.32%) never request for the information, (16.84%) rarely and sometimes request for this information, (40.00%) sometime request for this information, (20.00%) mostly request for the deliverable. It shows clear that the highest percentage of the respondent mostly request for this information while the never category has lower percentage of the respondents.

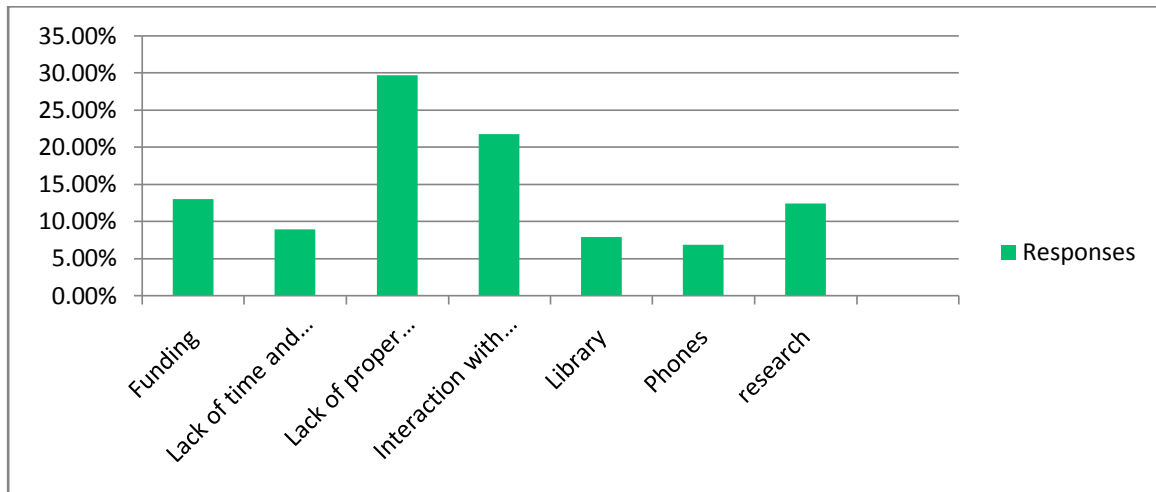


Figure 20: What Is the Source of Knowledge Available to The Respondents in Their Organization

Table 15: What Is the Source of Knowledge Available to The Respondents in Their Organization

What is the Source of knowledge available to the respondents in their organization?		
Answer Choices	Percentage	Frequency
Colleagues experience	13.02%	12
books/ Journals	8.97%	9
internet	29.77%	30
Interaction with outside party	21.77%	22
Library	7.97%	8
Phones	6.93%	7
research	12.49%	12
	Answered	100

RESULT INTERPRETATION:

Table 21 figure 16: The respondents believe that learning from Internet (is the highest source of knowledge available to them within their

organizations with a mean score of 30(29.77). The use of phone is the lowest source of knowledge available to them with a mean score of 7(6.93). And it could be deduced from this that the level of

knowledge sharing and transfer among the colleagues is high.

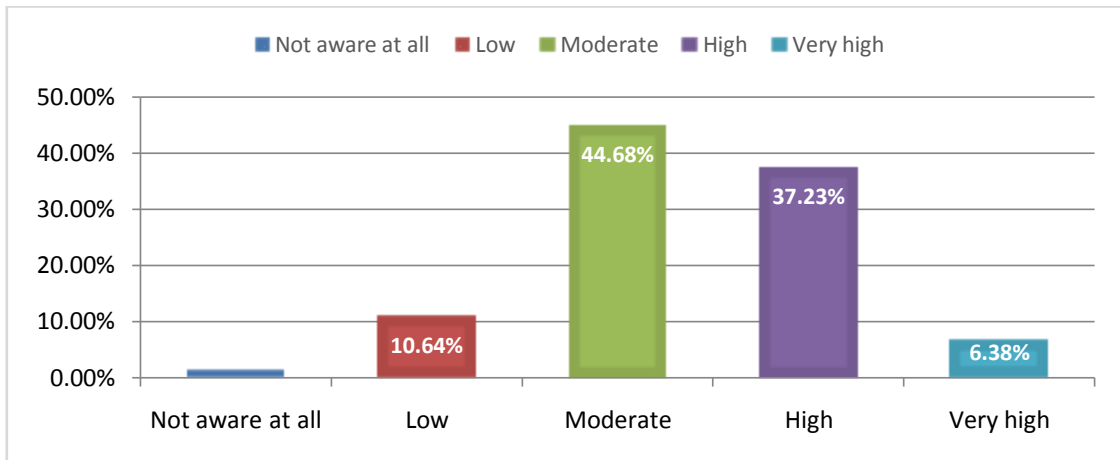


Figure 21: Extent of Awareness of Knowledge Management

Table 16: Extent of Awareness of Knowledge Management

Extent of awareness of Knowledge Management		
Answer Choices	Percentage	Frequency
Not aware at all	1.06%	1
Low	10.64%	10
Moderate	44.68%	42
High	37.23%	35
Very high	6.38%	6
	Answered	94
	Skipped	8

INTERPRETATION:

Table 17 Figure 22 revealed that some of the respondents are not aware 1(1.06%) while 10 (10.64%) has a low level of awareness of knowledge management and about 42(44.68%)

have a moderate knowledge management awareness, 35(37.23%) have a high knowledge of knowledge management (KM) while 6 (6.38%) rate very high on awareness of knowledge management.

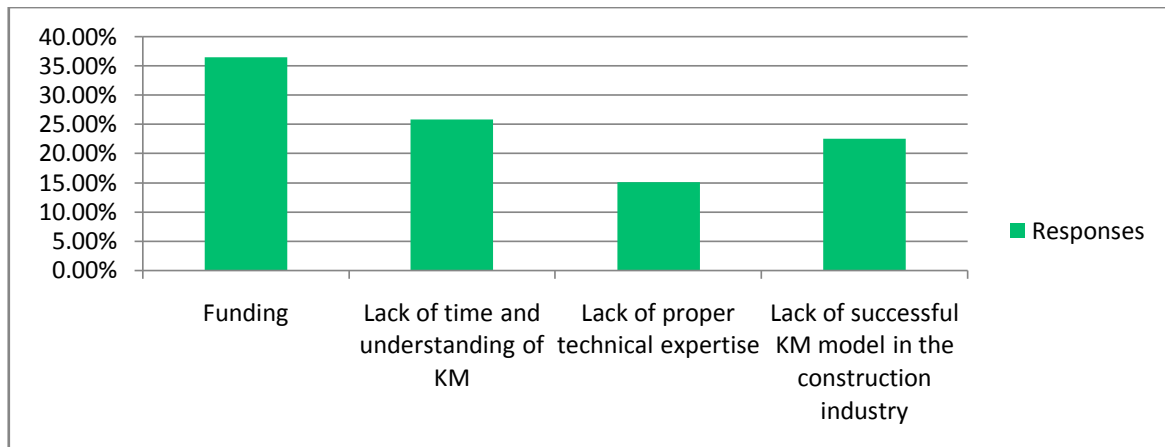


Figure 22: Problems of Knowledge Management in Construction Organizations

Table 17: Problems of Knowledge Management In Construction Organizations

Answer Choices	Percentage	Frequency
Funding	36.56%	34
Lack of time and understanding of KM	25.81%	24
Lack of proper technical expertise	15.05%	14
Lack of successful KM model in the construction industry	22.58%	21
	Answered	93

INTERPRETATION:

Table 18 Figure 23 above shows how respondent respond to funding in KM 34(36.56%) respondent reaction to lack of time and understanding of KM 24 (25.81%) respondent

reaction to Lack of proper technical expertise 14(15.05%) response from the respondent on lack of successful KM model in construction industry 21(22.58%).

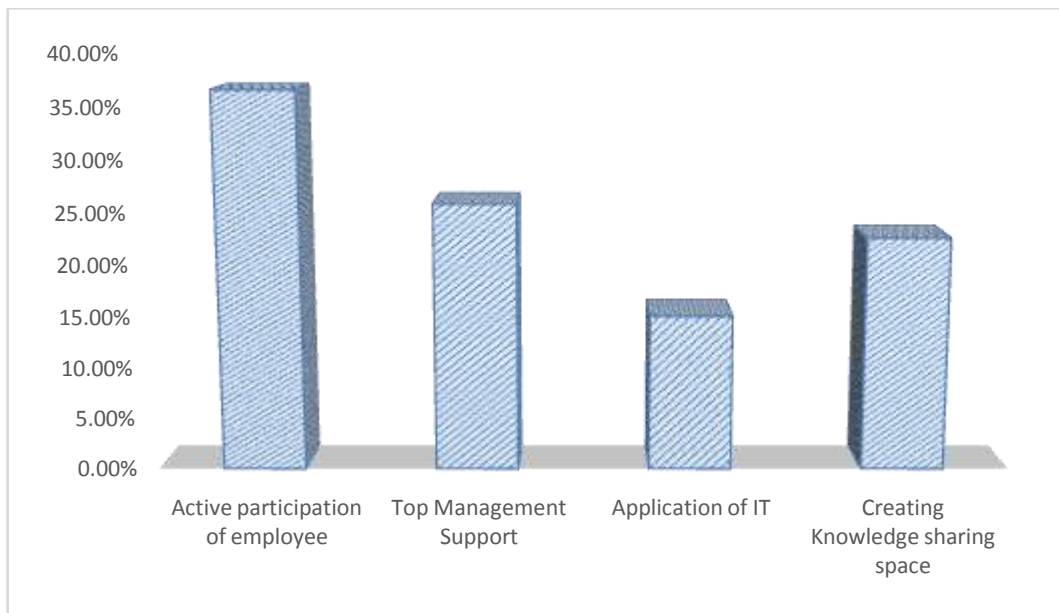


Figure 23: Factors Affecting Success of KM in the Construction Industry

Table 18: Factors Affecting Success of KM in the Construction Industry

Answer Choices	Percentage	Frequency
Creating Knowledge sharing space	36.56%	34
Application of IT	25.81%	24
Top Management Support	15.05%	14
Active participation of employee	22.58%	21
	Answered	93

RESULTS INTERPRETATION:

Table 19 and Figure 24 revealed that the respondents ranked active participation of Creating Knowledge sharing space as the most important factor for Knowledge Management success 40

(40.00%) followed by Application of IT 35 (35.00%). Top Management Support 12(12.00%) is the least important factor just below application of information technology.

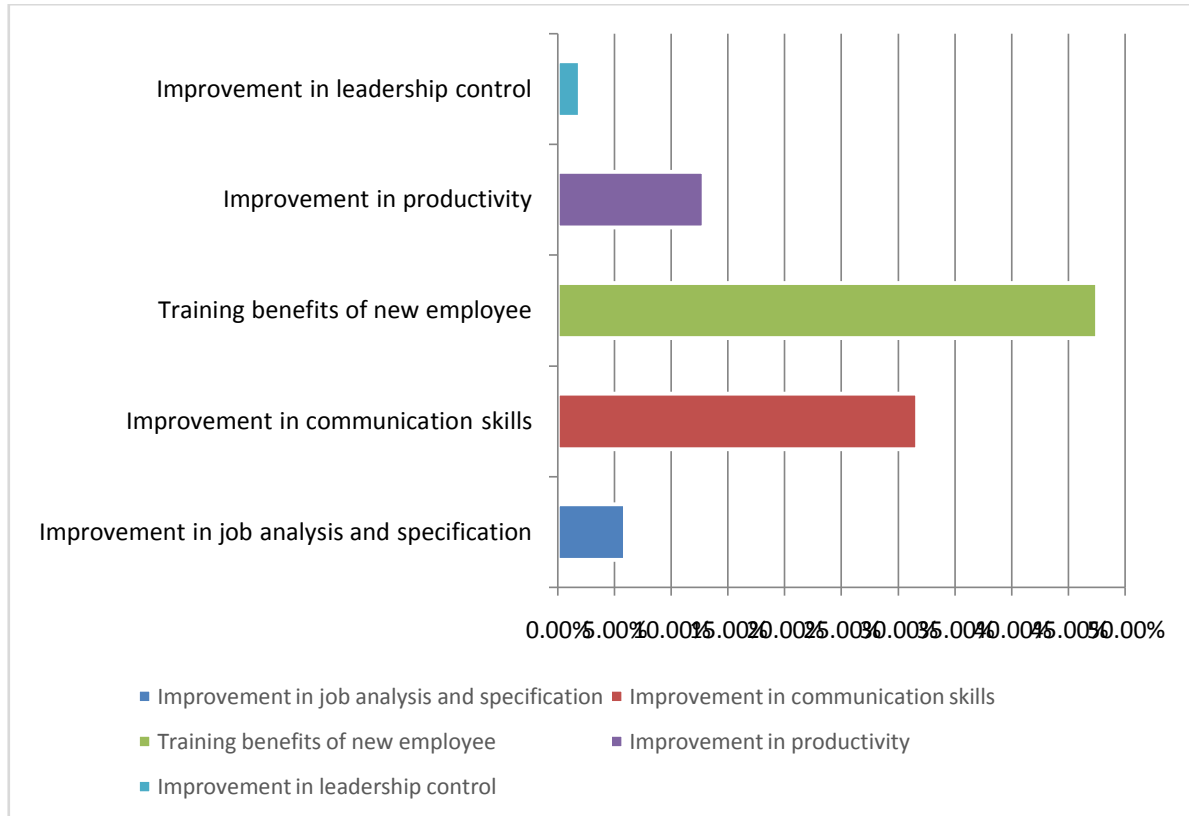


Figure 24: Benefits Derived from The Adoption of Knowledge Management

Table 19: Benefits Derived from The Adoption of Knowledge Management

Answer Choices	Percentage	Frequency
Improvement in leadership control	5.94%	6
Improvement in production	31.68%	32
Training benefits of new employee	47.54%	48
Improvement in communication skills	12.87%	13
Improvement in job analysis and specification	1.98%	2
	Answered	101
	Skipped	1

RESULT INTERPRETATION:

Table 20 Figure 25 the respondents believe that all the stated areas of construction work will improve but with the most improvement seen in Training benefits of new employee 48

(47.54%) and the least to be Improvement in job analysis and specification though it is all the areas that will improve if knowledge management is in place in any organization.

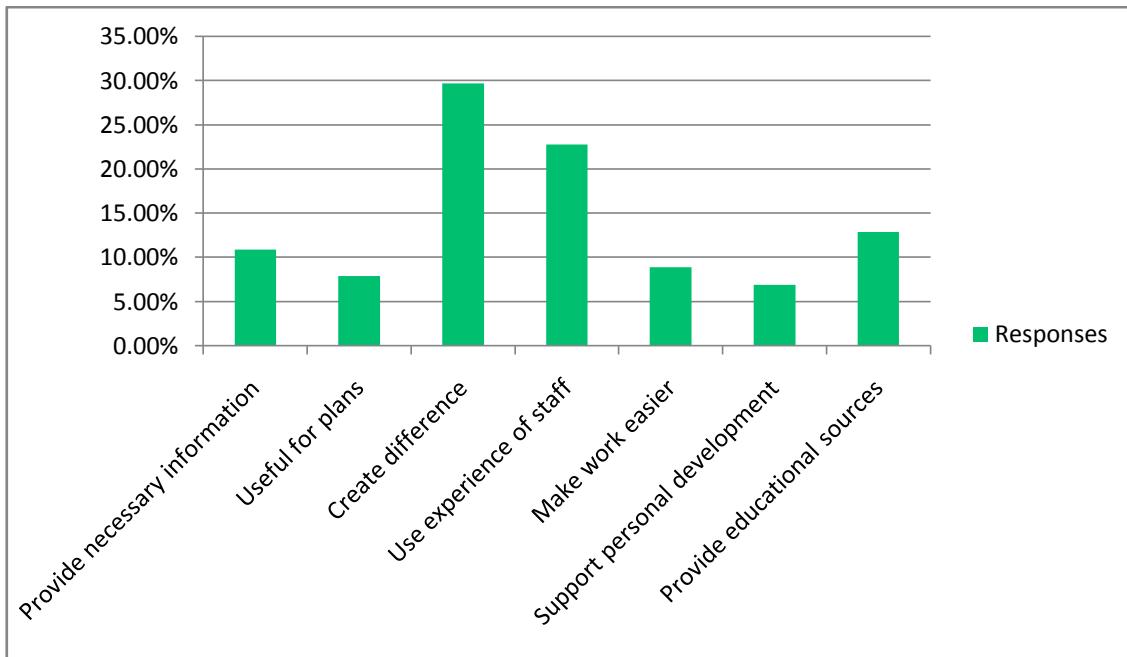


Figure 25: Various Opinion on Effects of Km Competencies of Project Manager Quality In Construction Firm

Table 20: Various Opinion on Effects of Km Competencies of Project Manager Quality In Construction Firm.

What is your opinion on effects of KM competencies of project manager quality in your construction firm		
Answer Choices	percentage	frequency
Provide necessary information	10.89%	10
Useful for plans	7.92%	8
Create difference	29.70%	30
Use experience of staff	22.77%	23
Make work easier	8.91%	9
Support personal development	6.93%	7
Provide educational sources	12.87%	13
	Answered	100

RESULTS INTERPRETATION:

Table 21 and Figure 26, the respondent’s opinion on effects of KM competencies of project manager quality in your construction firm with a mean score of 10(10.89%) Provide necessary

information, 8(7.92%) agree it is useful for the plans, 30(29.70%) says it create difference And 7(6.94%) been the list response agreed its Support personal development.

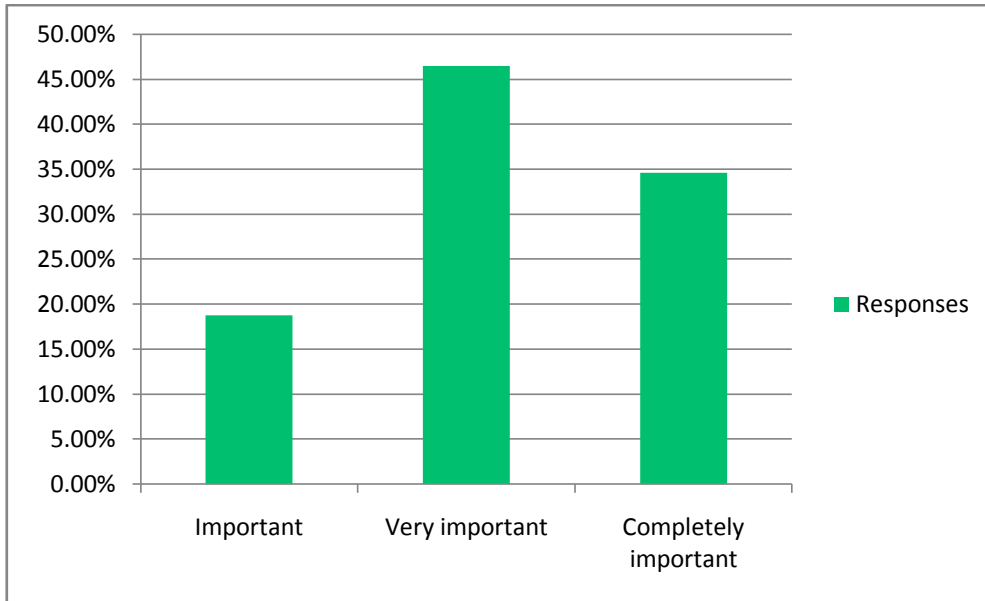


Figure 26: What Are Your Company Opinions on Importance of Km Competencies Of Project Manager Quality.

Table 21 What Are Your Company Opinions on Importance of Km Competencies of Project Manager Quality.

What are your company opinions on importance of KM competencies of project manager quality		
Answer Choices	Percentage	Frequency
Important	18.81%	19
Very important	46.53%	47
Completely important	34.65%	30
		100

INTERPRETATION

Table 22 Figure 27 the respondent’s company opinions on importance of KM competencies of project manager quality 19

(18.81%) agree to be important, 47(46.53%) says very important and 30(34.65%) says completely important.

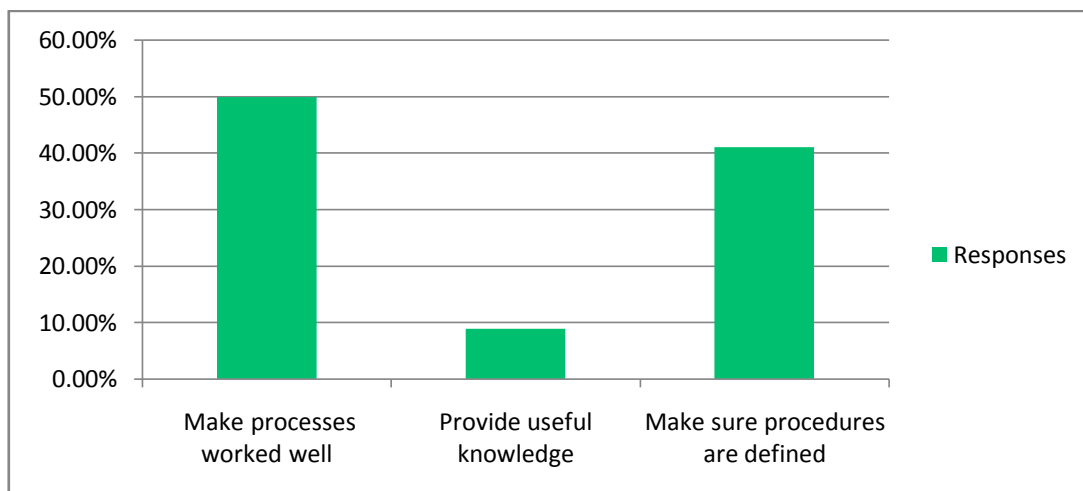


Figure 27: What Are Your Opinions on What Construction Companies Do About KM.

Table 22: What Are Your Opinions on What Construction Companies Do About KM.

What are your opinions on what construction companies do about KM.		
Answer Choices	Percentage	Frequency
Make processes worked well	50.00%	45
Provide useful knowledge	8.89%	8
Make sure procedures are defined	41.10%	37
	Answered	90

RESULTS INTERPRETATION:

Table 23 and Figure 28 above showing percentage of the opinions on what construction companies do about KM. 45 (50.00%) respondents agreed it Make processes worked well, 8(8.89%) respondents say it Provide useful knowledge, 37(41.10%) respondents say it Make sure procedures are defined

V. CONCLUSIONS AND RECOMMENDATION

This study has shown that the fragmented nature in which the construction industry is organised means that the efficiency in project delivery is frequently less than should be expected. Usually, this results in client dissatisfaction, low performance and profitability for construction organisations. For this and other reasons, forward-thinking construction organisations are now keen to appraise their KM activities as a means of supporting their overall capacities.

The present study was designed to examine the perceptions of KM strategies by conducting semi-structured interviews among construction practitioners in various Nigerian cities. It was established that KM relates to unlocking and leveraging the different types of knowledge to become available as organisational assets and its effective implementation enables organisations to learn from their corporate memory, share knowledge and identify their core proficiencies and deficiencies. This study found that generally there is a growing recognition of KM and its benefits within the Nigerian construction industry. In addition, the research has shown that there is still a lack of clarity on what exactly constitutes KM and its systematic application in the construction industry. It is worth noting that organisational culture and project personnel conduct were identified to be among the factors affecting KM deployment in the Nigerian construction industry. Therefore, to facilitate improvements in KM practice, the study proposed a shift in organisational culture and the introduction of communities of practice in the Nigerian construction industry as key strategies. A number

of caveats need to be noted regarding the present study. One important limitation was the size of participants. Another was the choice of methodological approach; future research may consider utilising quantitative data collection methods. Notwithstanding, the findings documented in this research project can still provide construction stakeholders in Nigeria with additional insights into KM activities in the construction industry and strategies for its advancement in the future. The study revealed that internet’ experience is the ready source of knowledge that is available to construction practitioners in Nigeria. This revealed that Nigerian construction practitioners rely mostly on what their colleagues share with them. It was also revealed that all elements of the construction industry will improve with effective Knowledge Management. Problem hindering the adoption of Knowledge management the most in the construction industry is funding while the least is Lack of proper technical expertise. More so, the major factors that contribute to the success of knowledge management in the construction industry are employee active participation, application of IT and creation of knowledge sharing space.

VI. RECOMMENDATIONS

The benefits, challenges and barriers that may affect successful KM in the Nigerian construction industry justify the need for stakeholders to adopt more coherent and structured approaches for utilising and managing knowledge in their respective projects and organisations. Previous construction industry reviews such as those of Latham (1994) and Egan (1998) have highlighted the need for continuous performance improvement within the construction industry. It is now recognised that learning, knowledge sharing and its management have become essential drivers necessary to achieve and sustain the construction industry’s performance. The preceding sections of this paper presented evidence on the state of KM in construction organisations in Nigeria from the perspectives of selected construction industry practitioners. It was established that knowledge

remains a strategic asset that construction organisations need to nurture constantly for their short and long-term leverage. It was also recognised that effective KM can result in the transformation of knowledge for construction organisations' use and continuous project improvement. However, the paper still maintains that the practice of systematic KM in the Nigerian construction industry has remained at its embryonic stage. Therefore, it became essential to propose strategies that can be used as 'navigation aids' to satisfy further the KM needs of the Nigerian construction industry.

The factors affecting KM deployment appeared numerous but were still classified under three major categories: the individual/ personnel, the organisation and technology/information categories. For the individual/personnel category, even though it was admitted that most personnel are competitive by nature and would be less inclined to share the knowledge they possess, the need for knowledge sharing among personnel within organisations could never be overemphasised. Additionally, construction organisations in Nigeria need to introduce systems that appreciate and recognise personnel's contribution towards the KM process within their organisations. Furthermore, training support needs to be provided to keep personnel abreast of relevant knowledge of recent trends in the industry.

On the part of the organisation, it should be accepted that the prevalent culture within organisations affects the manner in which knowledge is managed. For this reason, organisations need to grow cultures that promote and facilitate KM. Irrespective of size, construction organisations in Nigeria can also prioritise their KM activities to suit their organisation size and resource capacities based on their individual peculiarities. For senior management, there is an urgent need for a reorientation of their organisational cultures especially as it concerns allaying personal fears as well as their attitudes or resistance to knowledge sharing. By so doing, KM activities in construction organisations can be enshrined more deeply.

Regarding the technology and information category, construction organisations should attempt to incorporate both simplistic and sophisticated tools and techniques for knowledge capture and reuse. In today's world, most IT infrastructure provides an edge in gathering knowledge (especially tacit knowledge) from data repositories. Therefore, knowledge can be shared among the employees and would become easily accessible. Another way forward for KM practice in the

Nigerian construction industry is through the use of communities of practice. At the present time, communities of practice regularly use various forums, libraries, chat rooms, working papers and contact directories to disseminate their activities. Communities of practice in the Nigerian construction industry can equally propagate 'champions of construction practice'. The champions of construction practice can be developed as active experience and knowledge-sharing platforms to provide advice pertaining to issues of 'best practice' that have been accumulated from past projects and experiential knowledge. When well implemented, this should provide invaluable insights about best practice, which can be formalised and shared in a meaningful and reflective manner at both inter and intra-organisational levels.

There is a need for construction practitioners to embrace the use of KM since the application of knowledge management would make their jobs easier and facilitate good and instant result. More so, the government and other construction professionals should inject fund into knowledge management aspect of the construction industry so that the benefits that are derived from this area can be harnessed.

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APPENDIX

QUESTIONNAIRE ON EVALUATING AND IMPLEMENTATING OF KNOWLEDGE MANAGEMENT (KM) AMONG CONSTRUCTION PRACTITIONERS IN NIGERIA.

QUESTIONNAIRE SAMPLE

PART 1: RESPONDENT DETAILS

1 What is your professional role? (Please choose ONE option only. You can select an option by left-clicking on a checkbox)

- Project Manager Quantity Surveyor Engineering (Civil, Mechanical, Electrical, Agric Engineering).
 Construction Manager, Procurement personnel/officer Other (Please specify):

2. How long (in years) have you worked in this role?

- 0-10 11– 20
 21– 30 30 and Above

3. How long (in years) have you worked in the Nigerian construction industry?

- 0 – 10
 11– 20
 21– 30
 30 and Above

4. What is the main designation of your employer

(Please choose ONE option only)

- Public Authority/Client
 Private Client/ Developer
 Architectural Consultancy
 Quantity Surveying Consultancy
 Project Management Consultancy
 Civil/Structural Engineering Consultancy And construction management
 Other (please specify): Click here to enter text.

5. What is your position within your employing organization?

- Executive/Director/Owner

- Department head/unit head/senior management staff
- Team leader/middle management staff /senior staff
- Junior staff

6. Are you a member of a professional body/bodies (Please choose ONE option only)

- Yes No

a) If yes to Question 7 please specify the professional institution(s) and grade of membership if any:

7. Have you undertaken any continuous professional development (CPD) training relating to Knowledge Management (KM) in construction within the past ten years (Please choose ONE option only)

- Yes No. If No is the answer please Specify

8. What is your highest level of education? (Please choose ONE option only)

- PhD Master's Bachelors HND Other (please specify): Click to enter text.

9. What is your perception about KM in your various Construction Projects? Did you receive any lessons relating to received relating to Knowledge management (KM) among construction practitioners in their formal construction education? (Please choose ONE option only)

- Yes (if Yes answer 11) No (if No move to Question 1)

PART 2: KM CONSIDERATIONS AMONG CONSTRUCTION PRACTITIONERS

10. Within the past three years, how many construction projects have you been directly involved in the contractor tendering exercise (where direct involvement is either preparing the tender documentation or evaluating the tenders)? (Please choose ONE option only)

- None 1-5 6-10 11-15 16-20 Over 20

11. What is the most common nature of the projects? (Please choose ONE option only)

- New construction Refurbishment Demolition Others (Please Specify)

12. What is the most common type of the projects? (Please choose ONE option only)

- Building work Civil engineering work work) Others (Please Specify)
- Specialized work (e.g. mechanical, electrical & plumbing)

14. What is the most common range of duration of KM projects? (Please choose ONE option only)

- Up to 6 months 7-12 months 13-18 months 19-24 months Over 24 months

16. How often Was The following informatireque on sted From applying/tendering

DEVELOPERS/CLIENTS/CONTRACTORS?
 (PLEASE CHOOSE ONE OPTION ONLY PER ITEM)

	Never	Rarely	Sometimes	Mostly	Always
	(About 0 out of every 4 projects)	(About 1 out of every 4 projects)	(About 2 out of every 4 projects)	(About 3 out of every 4 projects)	(About 4 out of every 4 projects)
A. Technologies for Knowledge creation					

	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Knowledge sharing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Organizational culture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Knowledge Architecture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Leadership	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F. Organizational learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. What is the source of knowledge available to the respondents in their organization? (Please choose ONE option only)

- colleague experience
- Books/ journals
- Internet
- Interaction with outside parties
- Library Phones Research

18. Generally, how would you rate the Extent of awareness of Knowledge Management among construction practitioners? (Please choose ONE option only)

- not aware at all.
- Low.
- Moderate.
- very high.

19. What are the Problems of Knowledge Management in Construction Organizations?

- Funding lack of time and understanding of KM Lack of proper technical expertise
- Lack of successful KM model in the construction industry

20. In your opinion, what are the Factors Affecting Success of adoption of KM within the Construction Industry? (Please choose ONE option only)

- Creating Knowledge sharing space Application of IT Top Management Support
- Active participation of employee, Bureaucracy, bottleneck.

21. Generally, what are the Benefits derived from the adoption of knowledge management in project delivery among construction practitioners? (Please choose ONE option only)

- Improvement in leadership control Improvement in production Training benefits of new employee
- Improvement in communication skills Improvement in job analysis and specification

22. What are your company's opinions on importance of KM competencies of project managers quality.

- Not Necessary Necessary Highly Necessary

23. What is your opinions on effects of KM competencies of project managers quality in your construction firm.

- Support personal development Make works easier Useful for plans Provide necessary information

24. What is your opinions on what construction companies do about KM.

- Make processes worked well Provide useful knowledge Make sure procedures are defined



PART 3: GENERAL COMMENTS

25. Would you like to receive the research findings?

Yes No

If you answered yes to the above question, please provide your email address below.

Email address:

26. Please use the space below to provide any suggestion as to how Evaluating and Implementing Knowledge Management (KM) among construction practitioners can act as a vital tool for timely construction project delivery.



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