

**KNOWLEDGE MANAGEMENT PRACTICE OF BUILDING
CONSTRUCTION FIRMS AT PROJECT LEVEL IN LAGOS STATE**

BY

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AHMADU BELLO UNIVERSITY, ZARIA NIGERIA**

NOVEMBER, 2017

Declaration

I hereby declared that this work in this dissertation entitled KNOWLEDGE MANAGEMENT PRACTICE OF BUILDING CONSTRUCTION FIRMS AT PROJECT LEVEL IN LAGOS STATE has been carried out by James osuolale Olayiwola in the Department of Building. The information derived from the literature has been duly acknowledged in text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

James Osuolale Olayiwola

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Signature

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Date

Certification

This dissertation entitled **KNOWLEDGE MANAGEMENT PRACTICE OF BUILDING CONSTRUCTION FIRMS AT PROJECT LEVEL IN LAGOS STATE** by James Osuolale Olayiwola meets the regulations governing the award of the Degree of Master of Science (Construction Management) of the Ahmadu Bello University, and is approved for its contribution to knowledge and literacy presentation.

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Dedication

This dissertation is dedicated to my wife and my children who by their smiles encouraged me through out my study.

Acknowledgements

With gratitude to God Almighty who through His only begotten Son Jesus Christ enabled me to carry out this study. It is my pleasure to thank my project supervisors Dr. A. D. Abdul'Azeez and Dr. A. M. Stanley of the Department of Building, who made this research work possible with the commitment, encouragement, supervision, support, advice, suggestions offered and untiring patience in going through all my write-ups at various stages so as to make it successful. Their patience and kindness will never be forgotten. I have enjoyed working with them and appreciate their support and opportunities they provided.

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Abstract

This study assesses knowledge management (KM) practices of building construction firms at the project level in Lagos State. Despite the abundance and proliferation of various knowledge management tools and techniques, knowledge management practices are at a low level. Besides, approaches used for knowledge management practice by building construction firms are inadequate, weak, informal and unsystematic. However, the assessment of knowledge management practices of building construction firms at project level. The aim of this study is to assess the knowledge management practices of building construction firms with a view to promoting the adoption of best practices. The specific objectives were to assess the adequacy of knowledge management practices, extent of knowledge management practices, challenges confronting and level of success factors for knowledge management practices. Simple random sampling techniques were used to sample three hundred and thirty (330) project managers, who serve as respondents in building construction firms in Lagos State, Nigeria with a response rate of 78%. Data were collected on a four point Likert structured questionnaire. Data were analyzed using percentage and mean scores. The findings showed that management practices were adequate. The knowledge management practices were at a high level. (Overall mean = 2.68); face to face meetings are always the most popular approach for KM practices (Mean = 3.55) Apart from staff meetings, telephone calls (Mean = 3.54) also employed for knowledge management practices. This research also found that personalization techniques (56.06%) are frequently employed than codification techniques (43.94%). However, training (Mean = 2.39) is not widely used in building construction firms. Various barriers militating against knowledge management in building construction firms were lack of effective communication (Mean = 3.29). It was also found that creating knowledge sharing

space (Mean = 3.69); willingness to share knowledge (Mean = 3.61) and top management support (Mean = 3.36); are factors that contribute to the success of knowledge management practice. In conclusion, knowledge management practices were at high level and personification technique of knowledge practices dominates codification technique. The study also recommends the encouragement of building construction firms to develop a standard platform to capture and share knowledge in the presence of effective communication while project managers should be willing to share knowledge. In order to successfully capture, retain and transfer knowledge, senior management should recognize and plan for these needs so as to keep from losing valuable project knowledge.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Businesses nowadays are operating in a turbulent environment where organisations are searching for strategies that will enable them to improve their performance in order to stay ahead of the present and potential competitors (Ongori, 2009). To achieve these objectives, Obasan (2011) opined that the establishment and continuous existence of organization require the continuous and effective functioning of its materials input with the human element being indispensable in the day to day running of the organisation.

Knowledge, a justified true belief, is seen as one of the most important resources in any organization (Bhargav & Lauri, 2009). The success or even the survival of any organization depends on how effectively it manages the knowledge present internally and externally (Switzer, 2008). The fact that the role of knowledge management (KM) is to identify the information that is important to the organization, it performs activities which involve in discovering, capturing, sharing and applying knowledge.

The fact that knowledge has become an important asset of organisations it has become an absolute necessity for enterprises to pay great importance to knowledge management (KM). Effective management of this knowledge provides the capacity to reuse the existing organizational knowledge gained in the past via past experience and can greatly reduce the time spent on problem solving and increase the quality of work. Ineffectiveness in managing knowledge makes the knowledge irrelevant and not useful for organizations (Yusof & Abubakar, 2012). Besides, management is a key asset for organization survival and that the company is not in the market alone and number of the competitors is waiting

for its mistakes. Hence, there is an emerging need in the construction sector to effectively implement knowledge management systems with the aim of transcending boundaries for an organization.

Yu-Cheng & Lee-Kuo (2006) supported this view when they said that Knowledge is an important asset for all companies. With the rapidly changing environment and increase in competition, it is very important to manage knowledge properly in the construction industry. As in the other countries, Nigeria's construction industry is labour-intensive and relies heavily on practice and experience. Therefore, good knowledge management would probably benefit the exchange and re-use of knowledge in the short term and innovation in the long run. Many organisations are now engaged in knowledge management efforts in order to leverage knowledge from both within their organization and externally to their stakeholders and customers (Yu-Cheng & Lee-Kuo, 2006).

Due to the imperative nature of knowledge, scholars and practitioners have reported KM adoption as being widely recognized and practiced in diverse industry and established to a large extent its significant in terms of organizational performance (Suraj & Ajiferuke, 2013; Yang, Chen & Wang, 2012; Zwain, Teong & Othman, 2012; Gholami, Asli & Noruzy, 2012; Yang, 2010; Fugate, Stank & Mentzer, 2009). Still, there is a dearth of research into KM, its nature and complexities, especially with respect to subsequent organizational outcomes (Tseng, 2014; Kiessling, Richey, Meng & Dabic, 2009). It has become an essential issue for businesses to comprehend in what manner KM would be employed to instigate, improve, and sustain customer relationships, and increased firm performance.

The reuse of information and knowledge minimizes the need to refer explicitly to past projects; reduces the time and cost of solving problems, and improves the quality of solution during the construction phase of a construction project. Hence, experience and knowledge should be preserved and managed, that is, they should be captured, modeled, stored, retrieved, adapted, evaluated and maintained (Bhargav & Lauri, 2009).

The Nigerian construction industry has been described as a '*sleeping giant*' in terms of service delivery and capacity to satisfy the needs of its clients (Kolo & Ibrahim, 2010). There is a consensus among academic researchers and professionals that the Nigerian construction industry is slow to innovation (Odediran, Adeyinka, Opatunde & Morakinyo, 2012). Besides, no internal learning; there is lack of work place trust and support; there is arrogance of people who believe they know everything; and there has been lack of communication within an organization. The reasons are not far beyond lack of knowledge management in construction firms. Admittedly, construction activities are performed by people with different skills within and across organisations who must share knowledge for optimum decisions (Nzekwe, 2014).

The knowledge, once packaged, becomes part of the capital of the organization. This creates an environment for the rapid sharing of knowledge as well as sustained and collective knowledge growth. Lean times between learning and knowledge sharing are shortened and human capital becomes more productive through intelligent work processes (Oke, Ogunsemi & Adeeko, 2013).

According to Oke, et al., (2013), the situations are posing challenges to all stakeholders who are supposed to cooperate and ensure delivery of construction project effectively and efficiently. The fact that achievement of the overall goals and objectives of construction

project revolves around the ability to manage knowledge effectively, a major aspect of this research is expected to empirically assess knowledge management practices of building construction firms at the project level with a view to promoting the adoption of best knowledge management practices.

1.2 Statement of the Problem

The construction industry is a project – based industry. People from different departments, professions or companies gather as a team to complete a project. The duration of the project may be for several months or years. Upon completion of the project, this temporary group is disbanded and may never work together on other projects. Ochieveng, Price, Ruan, Egbu & Moore (2013) rightly supported the view when they observed that the global construction knowledge has been described as a strong, knowledge-based industry that relies heavily on knowledge input by different participants in project teams, and that the pool of knowledge is lost the fact that there are no effective ways of managing it. Indeed, the costs of attracting, recruiting, and retaining talented employees according to Laura, Loreta & Jurga (2008) are expensive. Conversely, according to them, there is no single strategy in place, to handle construction management problems that arise.

Nigerian building construction firms are acquainted with the concept of KM practices (Suraj & Ajiferuke, 2013; Suraj & Bontis, 2012), but not many efforts have been made to examine the KM application at the project levels. Bashir, Hashim & Aliyu (2014) reported that the attention given to KM system in Nigeria has been weak, inadequate and unstable, and has consequently affected its effectiveness and utilization. The study further revealed that the construction firms in Nigeria have always used different knowledge practices to produce goods and services; people do share knowledge but the extent of sharing is

informal and not systematic. It very much depends on individuals and their personal networks. However, sometime employees lack motivation or have no channels through which to share knowledge. As a result, their knowledge disappears once they leave a firm.

The inability of most building construction firms to effectively manage this knowledge, incapacitate them to reuse the knowledge gained in the past via past experience which greatly extend the time spent on problem solving and eventually lead to cost overrun. Ineffectiveness in managing knowledge makes the knowledge irrelevant and not useful for organizations (Oke et al. (2013).

Despite the abundance and proliferation of various knowledge management tools and techniques, study by Oke et al. (2013) revealed that knowledge management practice is at low level and that the level of knowledge among middle and front-line workers needs improvement. Besides, Bashir et al. (2014) reported that approaches used for the knowledge management by building construction firms are inadequate, weak, informal and unsystematic. It very much depends on network of individual and this has consequently affected its effectiveness and utilization and that the pool of knowledge is lost due to the fact that there are no effective ways of managing it (Zuofa, Burns & Ochieng 2015). A thorough investigation of the knowledge management system users' behaviours by Moonseo, Changbum, Hyun-soo & Seungjun (2007) revealed that the low usage and effectiveness of the current system were mainly due to the challenges of current knowledge management system while Chihab (2009) reported that many enterprises have a complete system of knowledge management but lack a corporate culture that supports it hence the efficiency of knowledge management is limited. However, the assessment of knowledge management practices of construction firms at project level.

1.3

Justification for the Study

This study is carried out in an attempt to assess the knowledge management practices at the project level in building construction firms with a view to enhancing best knowledge management practices. Although, Nigerian building construction firms are acquainted with the concept of KM practices still not many efforts have been made to examine the KM practices at the project level and that over-stressing on customer asset to the detriment of other intellectual asset elements (Suraj & Ajiferuke, 2013 & Suraj & Bontis, 2012).

There has been a general consensus that the building industry fails to retain project knowledge for future reuse due to lack of standard platform to capture and share knowledge. Many firms have documentation processes to capture knowledge, however in most instances they are not properly documented, and if documented they remain locked in archives. As a project-base industry, there is a need for knowledge management to improve the existing processes which will enable the capture and reuse of knowledge during and after the completion of project. Such a system will also help to build a database of best practices as observed by (Nwafor & Salau, 2009).

Organisations in Nigeria have always used different knowledge practices to produce goods and services; people do share knowledge but the extent of sharing is informal and not systematic. It very much depends on individuals and their personal networks. As a result, their knowledge disappears once they leave a firm. With the application of knowledge management, knowledge would hopefully be more securely managed.

Government recognized the construction industry as a potential motivator of the national economy, providing the driving force for either sustaining a buoyant economy or reviving a

depressed one, hence the need for productivity. A healthy and robust organizational environment will provide various benefits such as competitive edge derived from innovation and customer service; consistent, efficient employee performance; team cohesiveness, high employee moral and strong company alignment towards goal achievement. This situation in no doubt could influence the cost and timely delivery of construction projects.

This study will help to improve future communication by bringing group members together and help them learn more about each other. From learning each others' opinions on topics relevant to the organization's growth to understanding each member's preferred communication style, knowledge management within organization can give members the tools necessary to easily solve construction problems. According to Idoro (2012), efficient and effective construction provides a platform for development of a country's economy. He further stated that knowledge sharing across project is equally important the fact that knowledge transfers from a current to a concurrent or future project allow people to use existing proven knowledge to solve problems instead of generating a new, which can consume time and overall efficiency, is thereby increased, and project expenditures can be lowered. Critical factors for the success or failure of a project can also be shared as lessons learned or post-project reviews. This is crucial to the Nigerian contractors, as they are now operating in a highly competitive environment. Effective knowledge management would definitely improve the competitiveness of an organization.

It is also believed that the study would not only clarify but also create an awareness of the extent to which knowledge management can adversely affect project success and its implications to the stakeholders' interest.

1.4

Aim and Objectives

1.4.1 Aim

The aim of this study is to assess knowledge management practices of building construction firms at the project level in Lagos State with a view to promoting the adoption of best practices of knowledge management.

1.4.2 Objectives

Towards the achievement of this aim the study sets out the following specific objectives:

1. To determine the adequacy of the existing KM practices in building firms.
2. To assess the extent of KM practices in building construction firms.
3. To examine the challenges confronting KM practices in building construction firms.
4. To evaluate the KM success factors in building construction firms.

1.4.3 Research Questions

1. How adequate are the KM practices in building construction firms?
2. To what extent is the practice of KM in building construction firms?
3. What are the challenges confronting KM practice in building construction firms?
4. What are the success factors for KM practices in building construction firms?

1.5

Scope and Limitation of the Study

1.5.1 Scope of the Study

The study only covered knowledge management practices at project level in building construction firm. The area of study was Lagos State. The choice of Lagos state for this study was premised on the fact that the city has fair concentration of building construction firms. The data collected was mainly from building construction managers. Since creation of the state in 1967 and in spite of movement of the nation's capital to Abuja, it has not ceased to be the center of the country's commerce and power coupled with its highest population next to Kano. Lagos is a relatively 'built-up' environment with many infrastructures like buildings, roads, estates, schools, hospitals, shopping malls, government establishment and all kinds of private developments to mention a few. All these infrastructures are the handiwork of construction. As such there cannot be a better place to obtain data for this study.

1.5.2 Limitations

The scope of this research is limited to assessment knowledge management practices of building construction firms at the project level in Lagos State with a view to promoting the adoption of best practices of knowledge management. The study is limited to building project in Lagos State of Nigeria because there is easy access of information in Lagos State by the researcher. It was difficult to access samples of research population due to some firm's and construction manager's restrictions on the acceptance of questionnaires while some of the construction managers in some organisations did not find it fitting to provide personal information.

CHAPTER TWO

LITERATURE REVIEW

2.1 Knowledge Management in Building Construction Firms

Knowledge management has existed for long. People frequently come across and use different forms of common wisdom which they acquired from large scale, social, collaborative knowledge management (Bhargav & Lauri, 2009).

Construction industry is a project - based industry. People from different departments, professions or companies gather as a team to complete project This can comprise multidiscipline organization which may or not continue to work together once the project a completed. This temporary nature of construction and heavy fragmentation makes construction a significantly complex process. Construction is also an information intensive industry where stakeholders communicate a large amount of information across various stages of the project lifecycle. The combination of the two makes information management and knowledge management a very difficult task for the construction industry, resulting in poor efficiency of the overall process as observed by Yusof & Abubakar, (2012).

For these reasons, the industry has been under considerable pressure from clients and all who demand better products in shorter time and using fewer resources to improve the efficiency of the building construction process.

These companies are made up of small and medium building construction firms as categorized by (Abdulazeez, 2012). This has a corresponding employee's size of 1 to 10, 10 to 99 and 100 to 299 respectively. Also Odediran et al. (2011) classified construction firms

into small, medium and large in Nigeria. The nature of the large firms (over 300 workers) are said to have large numbers of workers.

2.1.1 Concept of Knowledge Management

Knowledge, a piece of information or a justified true belief, is seen as one of the most important resources in any organization (Bhargav & Lauri, 2009). Knowledge is at the highest level in a hierarchy with information at the middle level, and data to be at the lowest level. The success or even the survival of any organization depends on how effectively it manages the knowledge present internally and externally (Switzer, 2008).

Knowledge management, according to Kanagasabapathy, Radhakrishnan & Balasubramanian, (2012) is a managerial activity which develops transfers, transmits stores and applies knowledge, as well as providing the members of the organization with real information to react and make the right decisions in order to attain organization's goals. Uriarte (2008) described knowledge management as the conversion of tacit knowledge into explicit knowledge and the sharing of it within the organization. He stated further that it can also be concerned with the process of identifying, obtaining, sharing and preserving knowledge that is essential to the organization. Chang & Lee (2008) defined KM as useful processes that have effect on the performance of an organization in distinct ways.

Most definition of knowledge management is seen to entail the capturing, storing of knowledge and the process involved. Therefore, this study adopts the definition of knowledge management by Kanagasabapathy et al. (2012) which described knowledge management as a managerial activity which develops, transfers, transmits, stores and applies a knowledge as well as providing the members of all the organization with real information to react and make the right decisions in order to attain organization's goals.

In today's constantly quickly changing time is an absolute necessary for enterprises to pay great important to knowledge management the fact that it has become an important asset of organisations. Effective management of this knowledge provides the capacity to reuse the existing knowledge gained in the past via past experience and can greatly reduce the time spent on problem solving and increase the quality of work. Ineffectiveness in managing knowledge makes the knowledge not useful for organizations (Yusof & Abu, 2012).

2.1.2 Tacit Knowledge

Tacit knowledge is defined by Uriate (2008) as that knowledge that is stored in the brain of a person or individual. Dave & Koskela (2010) asserted that management of tacit knowledge becomes necessary in construction industry because of the temporary nature of the industry and also due to the unique nature of construction projects. Similarly, young Engineers, Architects, and Surveyors increase their academic training through mentoring that develops their knowledge in an organization. This experience enhances the daily functioning of organisations and contributes to the attainment of their objectives (Uriate, 2008).

2.1.3 Explicit Knowledge

Explicit knowledge is concerned with that knowledge that is contained in documents or other forms of storage devices other than the human brain (Uriate, 2008). To Akuegwu & Nwi-ue (2013), it is the creation, extraction, transformation and storage of the correct knowledge and information in order to design better policy, modify action and deliver results. The knowledge to be managed includes both explicit, which is documented knowledge and tacit, which is subjective knowledge. Knowledge management skills

including knowledge sharing, capturing, mapping and storing are required in the administration of organisations.

2.2 Knowledge Management practice in Building Construction Firms

There are many definitions of KM but at its essence it entails getting the right knowledge to the right people at the right time. According to Sandra & Anne (2010), from an organizational view this involves the process of critically managing knowledge to meet existing needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities. For knowledge to be useful it must be shared (Borges, Couto, Viera & Tiago, 2007) but difficulties arise when knowledge cannot be codified (Sandra & Anne, 2010). Explicit knowledge is more easily applied; hence tacit knowledge must be made explicit using techniques such as informal sharing or information systems (Abril, 2007). As knowledge is a fundamental element of all business activities and is therefore not restricted to any particular instrumental change programmed in organisations, this study uncovers key factors to be considered when an organization aims to implement a KM strategy. KM practices can now be discussed as follows:

i. Training/ E-Learning

A key aspect of knowledge management (KM), according to Ronald (2010) at the personal and team levels is to collectively and systematically' capture the learning and ideas that are taking place. Learning and idea capture is a guide on how to do this.

Many organizations would like to be more creative, generate more ideas, learn faster, and turn their new learning into better knowledge to share, apply, and exploit. Furthermore, 'The problem is not a shortage of new learning and ideas, but knowledge managers do not effectively capture these learning and ideas—and systematically do anything with them!'

there is the need to find better methods, tools, and techniques to do this collectively and systematically.

Yusof & Abubakar (2012), asserted that ineffectiveness in managing knowledge make the knowledge not useful for organizations For instance, if there are two organizations in the same competitive business and one organization does not capture learning and ideas, as they happen in the workplace—collectively and systematically—but does this 'episodically' from time to time. Knowledge workers know this is ineffective because most of the good new learning and ideas occur at the beginning of projects, and become forgotten over time. The other organization collects learning and ideas as they happen in the workplace—'continuously'—and submit them to people who are able to appraise them and turn them into better applicable knowledge each month. It does not require much imagination to see that the second organization will definitely learn faster, take smarter decisions, and create new innovative products and services faster.

The very process of writing down explicitly what you think you have learned, or a new idea, is a fundamental process of knowledge organization that will develop further and refine the tacit knowledge in the individual to the next higher level.'

Yusof & Abubakar (2012) argued that personal capture tools should be integrated with corporate capture tools. Naturally, electronic tools are much preferred to paper-based tools for less risk of omission, speed, and accuracy. However, the key step is to capture learning and ideas manually or electronically.

Capturing learning and ideas—systematically and collectively—is a new way of working for many people. It is a new discipline to learn. Apparently, approximately 10% of the

working population automatically likes to work this way, and many do so, naturally. This means that 90% of us need to learn how to work this way (Du-Plessis, 2008).

ii. Peer Tutoring

Ping (2010) said that tutoring knowledge includes information of common students' errors and misconceptions, and tutoring knowledge is the most important knowledge since it is the key for us to build a customized learning system for each worker, which can deliver appropriate individual instruction to help workers learn more effectively and efficiently and highlighted that:

- a It is a technique used by a project team to solicit assistance from peers and subject matter experts regarding a significant issue the team is facing.
- b Peer Assists are part of a process of what British Petroleum (BP) calls 'learning before doing', i.e., gathering knowledge before embarking on a project or piece of work.
- c The Peer Assist meeting usually lasts from half a day to 2 days. Both the project team and the peer discuss the project and potential issues/concerns and provide solutions. The team gains project insights from their peers in the meetings. The peers gain as well, learning from the project and from each other. Peer provides an avenue for project teams to resolve project issues with outside expertise. Teams can identify real underlying issues, and new approaches and solutions. The ability of the Peer Assist to tap into the experience and knowledge of peers makes it a valuable tool that yields immediate insights and results. The project leader normally initiates the assistance when he or she thinks peers could assist them in their project.

There is no fixed timetable as to when peers can be called in. Some Peer Assists are

called early in a project while some are called later. It depends on the needs of the project team and the complexity of the project. Teams who call for a Peer Assist are not obligated to use the suggestions provided by the peers.

It is not necessary for the project team to decide on the recommendations during the meeting. The project team can discuss the recommendations at a later project meeting.

Limit the number of Peer Assists to not more than six. It is difficult to have an in-depth discussion if the group is large.

Naoki (2010) argued that it is very imperative to invite only those who have expertise and knowledge regarding the situation the team is facing in the project.

- a. The project leader can get suggestions from the team members regarding the possible invitees to the meeting; the project team needs to think through the objectives of the Peer Assist meeting. The more specific and clear the objectives, the more successful the meeting will be.
- b. The project leader is the one who initiates the meeting and, thus, is at liberty to redirect the meeting if the discussion deviates from the objectives.
- c. The project leader or a skilled facilitator can facilitate the meeting. A leader who has a tendency to dominate the meeting should refrain from facilitating the meeting.
- d. Providing the peers with background information of the project and the objectives of the meeting will be helpful. This will ensure that the peer raters can contribute effectively in the meeting.
- e. Have all the project team members (or their representatives, if the team is large) to attend the meeting. This will provide an opportunity for each participant to ask questions pertaining to their area.

- f. The leader or facilitator should provide an opportunity for the project team members to respond and participate in the discussion.
- g. The project team needs to convene a meeting in order to review what team members have learned from the Peer Assist meeting.

ii. Collaborative Physical Workspace

Chihab (2009) defined Physical workspace, in this context, literally means as the settings in which actually work takes place — or simply the physical aspects of an office. When workers share or create knowledge, workers usually interact with other people through face-to-face communication—they discuss, dialogue, or simply just ask a question. The physical workspace is where such human interactions take place and it can support knowledge sharing/creation if it is well-designed.

Naoki (2010) argued that good physical workspace does not mean luxury office that small and medium-sized enterprises rarely afford. Instead, it is about understanding how people interact—or create and share knowledge, and designing physical environment to support such human activities.

The study stated further that the design of good physical workspaces to support knowledge sharing and creation varies a great deal, depending upon what kind of interactive scenes that an organization needs. Here are some examples of workspace designs to support knowledge-related activities: Working people naturally interact when needed; it is quite reasonable. Sometimes, however, unexpected interactions generate unexpected (good) results. Good open space encourages such ad-hoc, informal interactions among employees, or even between staff and customers. The key to encouraging such ad-hoc interactions through physical space is to create reasons for employees to come to commons—could be

coffee and snacks, magazines and books, or mailboxes and printers to pick up letters and copies (Naoki, 2010)

Ronald (2010) asserted that producing a creative workspace does not always lead to knowledge creation unless members who use the space understand, and become enthusiastic about, the concept of how to work in the environment. Besides, there is the need to discuss (i) how they want to work, and (ii) how physical space can support the manner of work among members who use the space. One good start: Observe how employees are actually working to find opportunities to support their behaviors that can lead to more knowledge creation and sharing.

iv. Libraries

Naoki (2010) defined taxonomy as a technique that provides the structure to organize information, documents, and libraries in a consistent way. This structure assists people to efficiently navigate, store, and retrieve needed data and information across the organization. It builds a natural workflow and knowledge needs in an intuitive structure.

Taxonomy can be considered according to him as a classification system, i.e., ‘The Table of Contents’ for an organization’s knowledge capital. Taxonomy also provides pointers to human-based expertise and knowledge.

Taxonomy can also include labeling of metadata, which allows the primary data or information to be systematically managed and manipulated. This metadata results in a hierarchical structure, which if done correctly, not only allows mapping by word pieces but also allows mapping by concept and inference.

Traditionally, the company intranet has quite often been the starting point for taxonomy

solutions. Organizations have discovered how mission-critical information can be better classified, stored, and retrieved (Naoki, 2010).

An organization saves an enormous amount of time when staff is able to quickly search and retrieve information necessary for their work. A search engine cannot provide relevant content or context for a search. It does not conclusively tell users they have all and everything they need. A search engine is most effective in targeted searches against known content or when combined with a taxonomy.

According to Kamlesh (2010), taxonomy facilitates effective retrieval, capturing, and recognition of content that is important to target users. Taxonomy helps users navigate from need to resource consistently and quickly. It provides context for information needs of the users.

2. Taxonomy also provides a common frame of reference for employees.

Many organizations are building and implementing taxonomy structures as governance over their knowledge assets and to build a collaborative workforce.

3. Taxonomy can also be used to build consensus, understandings, and shared vision and to help break down functional silos of the organization. Organizations are now beginning to realize the importance of the link between taxonomy and corporate culture and of having a common language to speak about mission-critical information.

4. Taxonomies cannot be all things to all people. If the taxonomy structure is too detailed, the content is not easily retrievable. If there is not enough detail, the taxonomy is not useful. Pick a business objective and limit the scope of the taxonomy. Scale the effort and the taxonomy to the size of the need..

v. Document Libraries Leading to a Document Management System

Kamlesh (2010) stated that from the Information Management science, and from the Library sciences, information and document management have always been interested in knowledge management. Efficient and effective access to documents is the antidote to 'information overload'. Maintaining a 'document repository' with good categorization and/or taxonomy and metadata (link to these later) is paramount to filing and, subsequently, searching and finding the right information at the right time.

'Information is the lifeblood of knowledge...

Our knowledge will be developed as well as our information allows.'

Furthermore, for KM, it is concerned with developing our knowledge assets. Ideally, knowledge workers should plan to identify what our key knowledge assets are, and should identify and develop information assets to support them. A good, well-planned document library, leading to a document management system, will pay dividends as part of any knowledge portal or KM system (Kamlesh, 2010). In addition, the first step is to select the Document Library system that will be used. There are many proprietary systems; some are expensive and very sophisticated while some are low cost and less sophisticated.

The following, according to the study, are the key ingredients for an effective document library system:

- a. A library system that can be backed up easily and regularly
- b. A library system that is automatically indexed and uses a good search engine
- c. A library system with effective security of access and usage
- d. A library system that can be accessed in a corporate intranet and/or from mobile laptops,

- e. The documents can be organized, searched, and listed by several categories
- f. Documents can be cross-referenced, hyperlinked, and stored in relational databases
- g. The document history of revisions is maintained and can be reinstalled at any stage, if required each document contains a 'life cycle' period of relevance and is automatically archived at a specified date.

1. Documents can be: managed overall by owners, edited by selected editors, authored by selected author, and viewed by selected groups (or open to all).
2. Documents can contain metadata and/or keywords for effective searching
3. Documents can be of different types, multimedia embedding, etc.
4. Document statistics record the number of views, duration of viewing, etc.

The study further revealed the best way to start to demonstrate a meaningful document library—in the context of a knowledge base, as a part of an effective KM system—is to 'walk' participants through each component section of the KM methods and tools. It contains text documents, spreadsheets, calendars, embedded pictures and video, PowerPoint template (PPT) presentations,

This is an example of putting a good document library to good use to support the development of a meaningful knowledge base that will demonstrate, teach, and give template examples of creating, sharing, and applying knowledge

Naoki (2010) said that it is difficult to imagine instances where and when document libraries are not to be used, apart from small, one-off information activities. Well-organized documents are the first step to effective KM. Document libraries can start simple and use free tools, such as Google Docs, and gradually develop into sophisticated document management systems. It is necessary to also take a look at 'Knowledge Bases' in this manual and the difference between information and knowledge. (Kamlesh, 2010).

vi. Journal

Moonseo, Changbum, hyun-Soo & Seungium (2007) looked at a Blog as a very simple 'journal style' website that contains a list of entries, usually in reverse chronological order. The entries are typically short articles or stories, often relating to current events. However, the entries do not have to be just plain text. They could also be photographs, videos, audio recordings, or a mixture of all the types.

The content of a blog may be created by a single author or, in the case of some of the more popular blogs, a whole collection of writers. Although any website could call itself a blog, there are several features that are generally found in blogs. These are:

- a. The content is essentially linear. Stories, and items, are added to a growing list, and readers can scroll through the list to see how the author(s) thoughts have developed.
- b. The blog has a focus. This is interpreted very liberally—people's blogs wander across a whole range of topics—but even when stretched to the limit, there is usually some sense that the blog is about something.
- d. The blog has a mechanism through which readers can comment on items. Some blog sites choose not to enable this feature. However, discussion is definitely one of the most useful aspects of blogging, although allowing it also tends to place a greater burden on the authors because comments normally need to be 'moderated'.
- e. The blog publishes an electronic index that allows people to automatically be aware when something new has been added. In essence, blogs offer an easy way for individuals, teams, and entire organizations to capture and publish information about specific topics and to make this information available, automatically, to as wide an audience as they want.

The details of how to establish a blog differ between the various providers of blogging software. However, the basic principles remain the same:

- a. Decide who you are writing for, and what tone you wish to adopt. For instance, do you wish to be very formal, or more informal? It is well worth reading a number of blogs to see the range of ways in which people communicate.
- b. Decide what topic(s) your blog will cover.
- c. Agree who will write entries.
- d. Decide how you wish to promote your blog. One of the simplest ways is to start adding relevant comments on other people's blogs, with links back to your own articles.
- e. Create the blog – If you are in a larger organization, you may wish to discuss the options with your IT department.
- f. Create your first entries.
- g. Keep going – Blogs are all about the ongoing creation of useful content.

Blogging is a useful and appropriate tool for communicating with a wider audience. They have also been used as personal journals without any intended audience beyond the author. However, the real value of blogging lies in the ability to create simple vehicles for the communication of new and interesting information. Over time, the contents of a blog can build up to become a very useful, searchable, knowledge base.

A blog should not be used for information that needs to be revised frequently (Andy, 2010).

vii. Online Network Services

Naoki (2010) defined social network as a group of people who share a common area of interest. Social network services are online systems that support social networking. The core services they offer usually include:

- a. Finding people who have similar interests or needs;

b. Aggregating people into groups, or subgroups, and being able to communicate with those groups; and

c. Sharing content, such as documents links to relevant websites, or even streaming video.

Social networks can be very powerful knowledge-sharing tools. A well-targeted network can provide its members with access to highly relevant knowledge, connections, and advice. In a business setting, knowledge sharing allows companies to have a much closer relationship with customers, and potential customers. Internet-based social networking has opened up a totally new way of managing customer relationships (Ronald, 2010)

There are, quite literally, millions of social networking sites. In fact, any website that allows people to register and hold discussions with other members could qualify as a social network. At its simplest, even an email distribution list can be quite an effective networking tool. The first challenge for anyone who wishes to gain the benefits of belonging to a network is to decide whether there is an existing network, which they can join, or whether they need to create a new one.

The benefits of joining an existing network, according to Yusof & Abubakar (2012), is that you will find a collection of like-minded people, and be able to have useful conversations immediately. However, if the topic you are interested in is poorly served, it is certainly possible to create a new network cheaply and efficiently. The steps for getting involved in a social network would, therefore, look like this:

a. Identify the topics you wish to network on.

b. Search the major social networks to see if there are any existing groups. If you want to use social networking as part of your strategy to service your customers more effectively,

you are likely to both join relevant existing networks, and to start a new one specifically dedicated to your business.

c. Join a network, and read through some of the previous discussions, in order to understand the tone and level. Many social network sites have different discussion areas depending upon, for example, people's level of expertise.

d. Once you feel comfortable in a network, join in the discussions and start to make connections.

e. If you want to start your own network because your specific areas of interest are not being well covered, it is often easiest to simply propose the new network within the discussion areas of your existing network. If enough people share your interest, it is usually very simple to create a new space.

g. Content is king. Your new network needs to be valuable to its members. This means that you and your colleagues need to work hard at finding relevant content, encouraging discussion and welcoming new members.

Social networks offer cheap and effective tools for knowledge sharing. If knowledge is important to your organization, there is almost certainly a network that you should be part of. In addition, the networks offer new ways to build deeper relationships with current and future customers. However, social networks, by their very nature, are designed to encourage discussion. If customers like your products, they will talk about them, and if they don't, they will probably shout about them. Many companies have been shocked at the strength of feeling that can be enumerated through social networking sites (Ronald, 2010).

viii. Building Knowledge Clusters or Internet

An internet forum is a web application for holding discussion and posting user generated content. Internet forums are also commonly referred to as web forums, message boards, discussion boards, (electronic) discussion groups, discussion forums, bulletin board or simply forums. The terms “forum” and “board” may refer to the entire community or to a specific sub-forum dealing with a distinct topic. Messages within these sub-forums are then displayed either in chronological order or as threaded discussions (Bhargav & Lauri, 2009).

Throughout history, organizations have grouped together in various types of cluster to be able to be more effective. Guilds, societies, associations, networks, etc. continue to help support and develop their members. However, since the birth of the 'Knowledge Economy', there has been far more emphasis on the knowledge contained, developed, and applied within organizations. There is much more interest in the different types of Knowledge Network. The Knowledge Economy and the primary (KM) processes, in turn, have been newly enabled, in radical and fundamentally new ways, by communication, information, and collaborative working technologies based on the Internet (Andy, 2010).

The term 'Knowledge Cluster' according to him is a term given to a group that—as a result of coming together in this new way—create, innovate, and disseminate new knowledge. In other words, different individuals, teams, and organizations can now come together, virtually, on the Internet, to better communicate, collaborate, learn, and share knowledge through the cluster.

The term is used, for example, to represent a group of companies in the same industry sector, e.g., high technology knowledge cluster, biotechnology knowledge cluster.

There are Regional Knowledge Clusters where groups of organizations come together,

regardless of their size, around specific topics. Often, there is a high incidence of innovation centers linked to local universities. At the center of the cluster, there is usually a research and development (R&D) topic and core public research institutions with high research potential. The system can also involve the participation of organizations and other groups from both inside and outside the locality or region.

A Knowledge Cluster may be viewed as a type of Community of Practice (COP). A Knowledge Cluster is a more focused COP, normally with the aim of combining knowledge resources to create new innovative products and services and/or organize and compete in new ways to win larger business contracts (Ronald, 2010)

There are many good reasons to form and/or join a Knowledge Cluster. Of special importance is the use of Knowledge Clusters for small and medium-sized enterprises (SMEs). This enables them to gain access to, and participate in, new knowledge networks with new knowledge resources. SMEs can now communicate, collaborate, learn, share, and apply their knowledge much faster and at a much higher quality than ever before (Andy, 2010).

ix. Collaborative/Conference Virtual Workspaces

Chihab (2009) stated that the essence of a collaborative virtual workspace is that it enables people to work together, irrespective of where they are physically located. In practical terms, this means that it has to involve a combination of document sharing, collaborative editing, and audio/video conferencing. Although suppliers offer software packages that contain all these elements, many users assemble their own collection of tools that meet their specific needs.

There are many reasons for using a virtual workspace, including

- a. It allows organizations to access the best skills anywhere in the world;
- b. It can dramatically reduce travel costs; and
- c. It allows people to work when and where is most effective for them, as well as giving them access to information when they need it.

Given the market's constantly evolving range of tools, it is difficult to recommend any particular suite. However, it is possible to talk about the general principles that should guide the development of a workspace.

- a. Start with people. The tools will tend to amplify existing work practices. Therefore, before introducing virtual tools, any work group or team needs to review its work practices and reflect on how it would work ideally.
- b. Make sure the technology is up to the job. Poor quality equipment, e.g., slow internet links or poor quality audio/video, will create a negative experience for users and will discourage them from future use.
- c. Train users at the appropriate time. Training is important for successful implementation. However, it should be provided as close to the intended use of the tools as possible.
- d. Start with human-centered tools. Audio and video conferencing build on natural human behavior. They also offer immediate benefits that—if the quality is good enough—save people time and stress.
- e. Introduce collaborative content creation in association with the audio/video conferencing so that it builds on top of the existing experience and allows the more experienced users to offer immediate assistance to their colleagues.

Ronald (2010) said that virtual workspaces are rapidly becoming an essential part of many organizations' work practices. And this trend is likely to continue. It is, therefore, important

to identify the situations where this approach may be inappropriate. The key situations would include:

- a. Poor internet connections. Various software tools enable people to work in poorly connected environments. However, if the connection proves to be too much of a barrier, the frustration caused to the users may outweigh the benefits of virtual working.
- b. The task requires direct physical collaboration. Although fashion design is increasingly being supported through virtual tools, there will be a range of tasks that genuinely require physical co-location.

x. Mentor / Mentee Scheme

Andy (2010) defined Mentoring as a work relationship between a senior and junior organizational member with an intentional agenda designed to transfer experience and learning. The mentor has experience and seniority in the organization, and personally advises, counsels, coaches, and promotes the career development of the mentee.

Mentoring is an intervention that has proven highly effective and has become especially popular in recent years. Mentoring is an excellent vehicle for general corporate career development. Mentoring is a form of knowledge sharing. It builds a caring, trusting culture. In terms of the knowledge-creation cycle, it creates a space for people where they can internalize explicit knowledge through reflection on their experiences, throw ideas around in a safe socialization space, and work to verbally express what they know (to externalize). The self-reflection that can result from a mentoring relationship can be a powerful growth experience and can give you new insights about yourself. This applies both for the mentor and the mentee (Ronald, 2010).

The basic purpose is to provide a mechanism for an informal interchange of knowledge and

expertise between senior and junior staff, in which help and advice for other than the normal day-to-day tasks and activities can be sought and suggestions and solutions offered. Some businesses start a program to help newcomers adjust; others use it as recruitment a tool or a method of leadership grooming.

2.3 Existing Knowledge Management Practices in Building Firms

2.3.1 Codification Strategy

The process of codifying explicit knowledge by individuals and storing it in repositories, from where it can be accessed, applied and reused by all members of the organization is codification. The codification process can be either continuous, as part of each individual's primary jobs function, or episodic wherein knowledge is codified periodically. The followings are codification knowledge flow 1. Internet 2. Training/ e-learning 3. Seminars/Presentations 4. Journals 5. libraries.

2.3.2 Personalization Strategies

Personalization strategies, on the other hand, is a mean of identifying individuals who possess knowledge and provide a medium for communicating both explicit and tacit knowledge directly between individuals rather than storing it in knowledge repositories. Individuals typically work and interact within small networks, and share knowledge within these network (or local neighborhood or searches). The construction industry is a project – based industry. People from different departments, professions or companies gather as a team to complete a project. The duration of the project may be from several months to years. Upon completion of the project, this temporary group is disbanded and may never work together on other projects. Zuofa, *et al.* (2015) rightly supported the view when they

observed the pool of knowledge is lost as there are no effective ways of managing it. Conversely, according to Laura, Loreta & Jurga (2008), there is no single strategy in place, to handle construction management problems that arise and that one of the most powerful tools is the best practice of knowledge utilisation and distribution. The summary of the existing knowledge practices inform of personalization are 1. Staff meetings 2. Peer tutoring 3. Phone calls 4. Peer interaction 5. Conferences and event.

Codification formalizes an organisation's knowledge for a broad scale of utilization and requires abundant implementation of technology, this enable individual to access and use the knowledge easily whenever it is required. This strategy is especially suitable for managing explicit knowledge, whereas personalization strategy is used in a situation where the knowledge is mainly stored in people's head or brains, while the sharing channel relies on human interaction. Unlike codification, personalization focuses on person to person transfer; technology becomes an instrument for communication, and not gathering knowledge. Transfer of tacit knowledge is more often done using this strategy.

Both strategies can co-exist and the proportion of the two approaches depends on the nature and function of different units under the parent organisations. Hansen *et al.* (1999) suggested that an 80-20 split should be followed in deciding strategy that is one approach should account for 80% of the knowledge management strategy, with the other one occupying 20% as support for the major one. Most organisations follow the 80-20 split, and the attempt to excel in both strategies will fail. Koenig (2001) questioned the 80-20 distinction, argued that a 50-50 mix does not necessarily cause failure. The research found that a successful company places equal emphasis on both codification and personalization. Instead, the best balance point should be within the 20-80 or 80-20 range.

2.4 Challenges of Knowledge Management Practices in Building Firms

One of the greatest challenges that knowledge management organisations faced is implementation. It is one thing for knowledge to be identified, acquired and stored and a different thing to be appropriately applied in the right direction to achieve desired result. Studies have considered knowledge implementation to denote “actualization” of the knowledge (Liao & Wu 2009; Asoh *et al.*, 2007). It is a decision involving the use of knowledge to enhance organizational performance and goals attainment (Ghalomi *et al.*, 2012), and should be applied at various levels or divisions in organization.

The typical construction organization does not encourage the culture of sharing knowledge. Wates group, a medium size UK building company, stated it took four and a half years before staff accepted the concept of sharing knowledge (Oke, et al., 2013). Primarily, the cultures of the organizations need to be addressed if KM is to be benefited. There are many other barriers to the successful implementation of KM within construction enterprises. These according to Oke, *et al.* (2013) the summary of challenges of KM includes:

a. Misunderstanding knowledge management as with information management

A lot of internal stakeholders make the confusion between information management and knowledge management. One of the most important tasks for the Corporate Knowledge Manager was to meet as many people as possible within the company to make the concept of Knowledge Sharing “crystal clear”. It means formal and informal meetings, discussions at the Cafeteria, training sessions on tools and put the Knowledge Sharing subject on the agenda of top manager meetings (Oke et al., 2013)

b. Lack of time and understanding knowledge management

Sharing knowledge demands additional efforts. This effort may be minimized by work practices and the introduction of better knowledge sharing tools. Construction projects are always working to tight deadlines. Anything that detracts from the main business is seen as of diminished importance. Chihab (2009) asserted that one of the biggest problems to success is staff members' complaints that they do not have enough time to do knowledge management. This is mostly based on the perception that knowledge management is sometimes "extra" that they believe need to do and not something that is integrated into their daily work environment. Their perceptions need to change for them to see that knowledge management is part of their daily work routine and not something extra that they do. They should be able to see the value added from the activities that they participate in. According to Chihab (2009) the problem in the construction industry is that employees usually have no time to share and evaluate knowledge before going on to the next project. If more time were spared between projects, individuals would have more time to combine, collaborate and reflect on knowledge obtained from the last project, resulting in a higher quality of knowledge sharing. (Du-Plessis, 2008).

c. Lack of effective communications among construction professionals

Lack of communication is another barrier for knowledge management. In order to gain the users "buy-in", the benefits of the knowledge management system must understood by management and explained to the users. When users do not understand the benefits offered by the newly implemented systems, they only see an added responsibility or burden. Additionally, Chihab (2009)'s study showed that in the absence of clear communication and guidance as to the objectives of the knowledge management systems, the negative

perception of the systems overwhelmed the positive. As a result common perceptions of users participating in his study were “only people with no work will use it” “Do managers keep tabs on who uses it? And so on.

d. **Lack of cooperation among the construction professionals.**

This challenge arises out of the structural imbalance between knowledge seekers and knowledge providers. The knowledge provider, while able to provide knowledge, typically has little or no incentives to do so, i.e. why would anyone in the organization benefit from my experiences and knowledge? Why should one give away the fruits of my labour for free to others here? As much as worker would like to pass on my knowledge, how could a worker possibly find the time to do it? The knowledge seeker is highly incentivized to receive knowledge, but unable to do so without the cooperation of knowledge provider. The effect of knowledge management should be justified by differences in people’s behavior during and after knowledge management, therefore measuring performance is an indicator of success (Chihab, 2009).

e. **Lack of adequate and up-to-date data**

According to Love, Fong & Irani (2005), there are three main types of knowledge that result from project-based working:

- a. Knowledge in projects which resides in project in the form of documentations meeting, repository, discussions
2. Knowledge about the project is knowledge that is required for executing a project and these include organizational design, designing, planning and controlling.
3. Knowledge from projects is the experiences achieved from executing project. This is informing of best practices, lessons learned, post-project reviews or after-

action reviews. Unfortunately not a great deal of time is spent on the latter, as people are pulled out from a project before it is actually completed, which in turns resulting in valuable lessons from the project not being recorded and therefore being lost. In some cases, the lessons are collected too late or are forgotten when the review is only carried out at the end of a project. This eventually result to difficulty in generalizing and storing knowledge and difficulty in capital valuing intellectual

2.5 Knowledge Management Success Factors in Building Construction Firms

A variety of factors determine significant success ingredients for knowledge management in construction projects in terms of these objectives. There are many previous researches in construction regards to identify critical success factors. Several empirical studies and the opinions of industry practitioners from archival data identifying significant factors affecting the success of KM projects were reviewed, and these factors are as follows (Shen, Qiping & Liu, Guiwen, 2003).

a. Establishment of a reward strategy

This factor consists of live items that focus primarily on the knowledge management strategy. Establishment of a reward strategy includes the development of a reward strategy and mechanism for knowledge implementation, the establishment of an effective reward strategy, and the improvement of involving in knowledge management activities. In addition, this factor also explains the commitment to improving knowledge sharing within the team, receiving adequate knowledge and experience from top to bottom, support from

all levels of management on the knowledge management implementation in construction (Yu-Cheng & Lee-Kuo, 2006).

b. Mutual Trust

This factor includes four items pertaining to trust relationship. Each member and party should trust, rely on, and understand other parties' decisions. There will be no weak links among team members if this occurs. The issues could be resolved in timely and responsive manner.

c. Willingness to share knowledge

This factor includes two items that are related to the willingness to share knowledge among project participants. The willingness to share knowledge and a great deal of involvement of end-users are included in this factor. This involves ability of the project participants to be able to creating knowledge sharing space which will considerably help and create adequate knowledge management process within and outside the organization (Yu-Cheng & Lee-Kuo, 2006).

d. Top Management support

This factor according to Yu-Cheng & Lee-Kuo (2006), explains the degree of top management involving and taking knowledge management seriously. Without the support or taking seriously knowledge management by the top management, it will be very difficult to implement knowledge management as this will require a huge sum of money to be able to carry out knowledge management successfully.

e. Evaluation of knowledge management process

Yu-Cheng & Lee-Kuo (2006) further explained that five items comprises the elements of this factor regarding the evaluation and monitoring of the knowledge management process. Evaluation and monitoring methods include the evaluation of knowledge exchanging and reuse performance, well-defined procedures and responsibilities, and determining measureable goals of individual responsibilities. The evaluation and monitoring process could be ensured by a team leader of knowledge management department champion. Other factors include creating knowledge sharing space that is conducive for knowledge management. According to Du-Plessis (2008), the problem in the construction industry is that employees usually have no time to share and evaluate knowledge before going on to the next project.

f. Application of IT

Lei & Goce (2010) observed that Information technology (IT) has long been recognized as crucial for successful knowledge management. This is probably a legacy of the growth in knowledge based system in the 80s and early 90s, and has led to much of the early work on knowledge management focusing on the delivery of technological solutions. While it is now recognized that good knowledge management does not result from the implementation of information systems. As a result, Novo & Chan (2007) suggested that a revised approach to developing knowledge management system where technology should not be created as a standard application but strongly integrated with overall technology's needs of the firms.

g. Active participation of employees.

According to Yu-Cheng & Lee-Kuo (2006), this factor involves ability of project participant to actively involve in all activities that involve knowledge management in the organization. For participant not being actively involved in the process, sharing of knowledge gained by individual will be extremely difficult. The effectiveness of knowledge management can be evaluated through staff involvement and motivation in projects. The greater the staff involvement, the greater the potential for knowledge transfer.

h. Creating space for knowledge management

The willingness to share knowledge involves ability of the project participants to be able to creating knowledge sharing space that can considerably help and create adequate knowledge management process within and outside the organization. Top Management support brings about the degree of top management involving and taking knowledge management seriously. Without their support, knowledge management will be very difficult to implement as this will require a huge sum of money to be able to carry out knowledge management successfully ((Yu-Cheng & Lee-Kuo, 2006).

2.6

SUMMARY

In this section, knowledge and knowledge management practices were defined. For the present purpose knowledge was defined as a piece of information or justified true belief and it is seen as one of the most important resources in any organization. It is at the highest level in a hierarchy with information at the middle level, and data to be at the lowest level. The success or survival of any organization depends on how effectively manages and apply the knowledge within an organization. Knowledge management is concerned with the activities that involve capturing, storing, maintaining, shearing and applying knowledge

within and outside an organization. In this chapter, tacit and explicit knowledge were also discussed.

Knowledge management practices in building construction firms were also discussed. The knowledge management practices were training, peer tutoring, collaborative physical workspace, libraries, journal, online network services, internet, conferences, and mentoring and existing knowledge management techniques in building firms.

Also discussed in this chapter are the challenges confronting knowledge management practices. Such challenges are misunderstanding knowledge management as with information management; lack of time and understanding knowledge management; lack of effective communications among the construction professionals; lack of cooperation among the construction professionals; lack of adequate and lack of up to date data.

Factors that contribute to the success of knowledge management practices were also discussed in this chapter. Success factors such as establishment of a reward strategy; mutual trust; willingness to share knowledge; top management support; evaluation of knowledge management practice; application of IT; active participation of employees and creating space for knowledge management.

CHAPTER THREE

RESEARCH METHODOLOGY

This section discusses the method involved in carrying out the study. The sub-headings here include: design of the study, population of the study, sampling techniques and sample size, method of data collection, and method of data analysis.

3.1 Research Design

A quantitative research method was adopted for this study through a questionnaire survey as did by other researchers on a similar related area of study (Mukherjee, 2007; Zuofa & Ochieng, 2015 & Oke et al. 2013). It was adopted for this study because Kasimu et al. (2013) highlighted that the beliefs, perception, ideas, views and thought of construction managers about area under study can be gotten very easily due to the flexible nature of questionnaire survey.

A quantitative research method was adopted for the study by the following researchers: Mukherjee (2007) who carried out a research on impact of knowledge management strategy on organizational learning. Sandra & Anne (2010) also conducted a research on assessing the impact of knowledge management on organizational practice: applying the MeCTIP Model to UK organization. Bhargar & Lauri (2009) also carried out a literature review research to explain collaborative knowledge management in a construction projects. Zuofa et al. (2015) carried out a research to appraise knowledge management perceptions among construction practitioners. Besides, Oke et al. (2013) conducted research on assessment of knowledge management among construction professional in Nigeria to examine the areas of the construction industry that will improve as a result of the

contributions of knowledge management. The use of structured questionnaires was adopted by all these researchers; therefore, this research adopted the use of questionnaire to collect data from the respondents.

3.2 Study Area

The study only covered knowledge management practices in building construction firms at project level. The study area for this research work is Lagos State. The choice of Lagos state for this study was premised on the fact that the city has a fair concentration of building construction firms. Since creation of the state in 1967 and in spite of movement of the nation's capital to Abuja, it has not ceased to be the center of the country's commerce and power coupled with its highest population next to Kano. Lagos is a relatively 'built-up' environment with many infrastructures like buildings, roads, estates, schools, hospitals, shopping malls, government establishment and all kinds of private developments to mention a few. All these infrastructures are the handiwork of construction. As such there cannot be a better place to obtain data for this study.

3.3 Population and Sample Size

3.3.1 Population Size

The population frame of 2533 project managers was used in this study which was drawn from 2533 registered building construction firms retrieved from FIRS 2015 in Lagos State. One manager was selected from each company.

3.3.2 Sampling Technique and Sample Size

Sample of a research is described as a limited number of observations from a population. Usually samples are drawn because it is impossible to cover all observations in a population (Ibrahim, 2011).

Since the population (N) = 2533 is known for a categorical data with margin of error = 0.05, $p = 0.05$ and $t = 1.65$; therefore the sample size (n) = 254 is obtained from the table of Bartlett, Kotrliks, & Higgins, 2001. According to Bartlett et al. (2001) a margin of error between 3% and 5% is acceptable for educational research.

Salkind (1999) stated that 10% - 50% of the corrected sample size can be added to the initial sample size. Therefore, 40% of (n) is added to account for lost questionnaires or uncooperative respondents as recommended by (Salkind, 1999).

Therefore sample frame is obtained as shown

$$\text{Sample frame (n)} = 254 \times 0.40 = 76 + n = 76 + 254 = 330$$

Therefore, the study finally administered 330 copies of questionnaire to building managers in building construction firms in Lagos State. To this end, simple random sampling was used to select the building firms that were issued the structured questionnaires through hand delivery to managers in their offices.

3.4 Data Collection Techniques

Data was collected using structured questionnaire survey. It was structured to facilitate the collection of opinion of expert professionals in the construction industry. The researcher employed and trained three (3) research assistants to administer questionnaires. The

researcher together with the research assistants administered and retrieved the questionnaires in a period of four months between November 2016 and February, 2017.

3.4.1 Data Collection Instrument

Structured questionnaires were used for data collection. The questionnaire is divided into five (5) sections A, B, C, D, and E. Section A consists of items dealing with the profile of the respondents, section B contains extent of knowledge management flow in building firms that address objective one (1) of the study, section C contains existing knowledge management approach in building firms that address objective two (2), of the study, section D contains the challenges of knowledge management practices in building firms that address objective three (3) of the study, and section E contains knowledge management success in building firms that address objective four (4) of the study. The four point likert-type rating scale was adopted for the questionnaire. Responses were of the types Very High Extent, High Extent, Low Extent and Very Low Extent, Very Adequate, Adequate, Not Adequate, Not Very Adequate of knowledge management practices in building construction firms; Strongly Agree, Agree, Disagree and Strongly Disagree on the challenges and success factors for knowledge management practices in building construction firms. (4, 3, 2, 1).

3.5 Data Analysis Techniques

In analyzing data collected, simple means and percentage were used for the study. The analysis of data was carried out in accordance with the research questions using percentage (%) as descriptive. In each case, the responses to the questions were scored and the mean and percentage were determined and presented in tabular forms.

CHAPTER FOUR

4.0 ANALYSIS, PRESENTATION AND DISCUSSION OF FINDINGS

This section of the study gives the details of how data for this research were collected from the field survey and the analysis of the data, presentation and discussion of findings. In this study descriptive statistics are used for the main features of a collection of data in quantitative terms. This involved the use of frequencies, percentages and means for presenting description finding of the survey. These techniques were employed for analyzing data related to the characteristics of the respondents, their organisations and closed-ended questions.

A total of 330 questionnaires were self administered and filled by construction managers in construction firms which made up 78% returned questionnaires.

Table 4.1: Response to Questionnaires Administered

Questionnaire	Number	Percentage
Distributed (Sample frame)	330	100
Returned	257	78
Used for the study	257	78
Not used for the study	0	0

Source: Field Survey (2017).

Table 4.1 described the representativeness of questionnaires administered and returned from the field survey. A total of 330 copies of questionnaire were issued. However, after series of follow-up and reminders, only 257 questionnaires were completed and returned. The number of questionnaire completed and returned was higher than the sample size computed for the study 254. Based on the foregoing assertion, the numbers of

questionnaires completed and returned were therefore considered adequate for analysis as 257 represents 78% of the total questionnaires administered (330).

4.1 Demographic Data

This section contains the data of the respondents as company firm's size, professional qualifications, and year of experience of professionals.

4.1.1 Profile of the Respondents of the Study

Table 4.2: Distribution of Respondents by Qualification

Qualifications of the Respondents	Frequency	Percentage
Ph.D	7	2.72
M.Sc	39	15.18
B.Sc	134	52.14
HND	77	29.96
Total	257	100

Source:- Field survey (2017)

Table 4.2 shows the respondents by qualification. 2.72% managers hold Ph.D., 15.18% hold M.Sc., 52.14% hold B.Sc. and 29.96% hold HND. It could be seen in this research that professionals with Bachelor' degree B.Sc. are those that participated in the research as they made up the largest percentage of the responses. This shows that all the construction managers are not only academically inclined but also have knowledge on area under study.

4.1.2 Working Experience of the Respondents

Table 4.3: Distribution of Respondents by working experience

Experience of the Respondents	Frequency	Percentage
1 – 5 years	59	22.96
6 – 10 years	119	46.30
11 – 15 years	67	26.07
Above 15 years	12	4.67
Total	257	100

Source: Field survey (2017)

Table 4.3 shows the year of experience of respondents that took part in this research. Thus 22.96% of the construction managers have 1 to 5 years of experience, 46.30% has experience between 6 to 10 years followed by 26.07% respondents with 11 to 15 years experience and lastly 4.67% responses from managers with over 15 years of experience. As it is observed 46.30% of the construction managers with experience between 10 and 15 years has the highest percentage of responses. Therefore, responses obtained from a sample like this have been practicing knowledge management in one way or the other.

4.2 Assessment of Knowledge Management Practices in Building Construction Firms

4.2.1 Adequacy of Existing KM Practices in Building Construction Firms.

Table 4.4 Adequacy of existing KM Practices in Building firms. N = 257

S/No.	KM Practice	VA	A	NA	NVA	Mean	Std. D	Rank	Decision
1	Telephone calls	152	100	4	1	3.57	0.691	1	Adequate
2	Staff meetings	76	171	10	0	3.26	0.210	2	Adequate
3.	Conferences /events	69	171	13	2	3.18	0.212	3	Adequate
4.	Seminar/presentation	51	185	18	3	3.12	0.226	4	Adequate
5.	External course	63	162	28	4	3.12	0.205	4	Adequate
6	Internet	57	173	22	5	3,11	0.215	6	Adequate
7.	Peer tutoring	57	171	25	4	3.10	0.213	7	Adequate
8.	Training/E-learning	45	173	35	4	3.01	0.230	8	Adequate
9	Libraries	47	151	55	4	2.94	0.207	9	Adequate
10	Journals	30	190	37	0	2.93	0.282	10	Adequate
	Average Mean					3.13			Adequate

(4- (VA) Very adequate, 3- (A) Adequate, 2- (NA) Not Adequate, 1- (NVA) Not Very Adequate

Source: Field Survey (2017)

In Table 4.4, reveals that knowledge management practices are adequate. The mean scores ranged from 2.93 to 3.57 with telephone (mean=3.57), staff meeting (mean=3.26), conference/event (mean=3.180, seminar (mean=3.12), external course (mean=3.12), internet (mean=3.11), pear tutoring (mean=3.10), training (mean=3.10), libraries (mean=2.94) and journal (mean=2.93).

It is therefore, obvious that existing knowledge management practices in building construction firms were found to be adequate given the overall average mean of 3.13. This result is contrary to the studies by Bashir et al. (2014) where the study reported that approaches used for knowledge management practices by building firms to be weak and inadequate.

It is obvious that all the knowledge management practices are adequate if they are employed and properly utilized by building construction firms in the presence of management support in terms of availability of funds. If proper knowledge management practices are employed, there is no doubt that the opportunity to exchange knowledge will be considerably higher.

4.3 Extent of Adoption of Selected Knowledge Management Practices

Table 4.5 Extent of Adoption of Selected KM Practices in building firms.

N = 257									
S/No.	KM Practice	VH	H	L	VL	Mean	Std. D	Rank	Decision
1.	Staff meetings	154	89	14	0	3.55	0.700	1	High Extent
2.	Telephone calls	152	94	9	2	3.54	0.703	2	High Extent
3.	Peer tutoring	50	194	55	8	2.92	0.585	3	High Extent
4.	Conferences / events	32	142	68	15	2.74	0.217	4	High Extent
5.	Seminar/presentation	27	140	75	15	2.70	0.613	5	High Extent
6.	Internet	35	52	155	15	2.42	0.240	6	Low Extent
7.	Training/E-learning	20	78	140	19	2.39	0.594	7	Low Extent
8.	External course	10	70	160	17	2.28	0.633	8	Low Extent
9.	Libraries	10	37	190	22	2.15	0.650	9	Low Extent
10.	Journals	18	40	155	44	2.12	0.600	10	Low Extent
Average Means						2.68		High Extent	

(4- (VH) Very High, 3- (H) High, 2- (L) Low, 1- (VL) Very Low)

Source: Field Survey (2017)

Table 4.5 reveals the extent of adoption of selected knowledge management practices in building construction firms. The mean scores ranged from 2.12 to 3.55. Staff meetings (mean=3.55) and telephone calls (mean=3.54) score above 3. Peer tutoring (mean=2.92), conference/event (mean=2.74) and seminar (mean=2.70) scores were relatively high.

While the mean scores of internet (mean=2.42), Training (mean=2.39), external course (mean=2.28), libraries (mean=2.15) and journal (mean=2.12) were relatively low.

From the analysis of data collected, it was clearly shown that the adoption of knowledge management practices in building construction firms were to a high extent (given the overall average mean of 2.68). This is contrary to the study by Oke et al. (2013) when they reported that knowledge management application is at a low per level.

Furthermore, staff meetings received the highest scores (mean = 3.55). This implies that the face to face meetings are always the most popular approach to knowledge management practices in building construction firms. Moreover, the items ranked second to third in ascending order were telephone calls (mean = 3.54), peer tutoring (mean 2.92) and conference and events (mean = 2.74). The results reveal that after face to face meetings, other frequently employed means of knowledge management practices is telephone calls, peer tutoring followed by conference/events and seminar.

Besides, staff meetings received mean score of 3.55 while telephone received mean score of 3.54. It can be seen that the difference in their means is 0.01. This shows that there is no significant difference between the two means of knowledge management practices. It means that the two knowledge management practices are dominant knowledge management practices in building construction firms. The reason may be as a result of people's preference for more direct approaches to knowledge practice.

4.3.1 Codification/Personalization of Knowledge Management Practices

Table 4.6 Codification/Personalization of Knowledge Management Practices

S/No.	Codification	Mean score	Personalization	Mean score
1.	Libraries	2.15	Staff meetings	3.55
2.	Seminar/presentations	2.70	Phone calls	3.54
3.	Internet	2.42	Conference/events	2.74
4.	Journals	2.12	External course	2.28
5.	Training/presentation	2.39	Peer tutoring	2.91
		11.78 (43.94%)		15.03 (56.06%)

Source: Field Survey (2017)

Table 4.6 shows the ways in which knowledge management practice would dominate. The compositions in table 4.6 are reliant on a certain approach and this is shown in the final mean values received. Personalization is knowledge stores in peoples' heads while codification is more formal and the use of technology is for storage knowledge.

The scores in terms of codification are 43.94% and personalization scores 56.06%. It is obvious in the above results that the result does not match the 80-20 split suggested by Hansen, Nohria, & Tierney, (1999) none agree with 50-50 balance suggested by Koenig (2002). This also shows that personalization practices are frequently employed than codification practices of knowledge management.

It means building construction firms employed informal documentation for knowledge management practices. This practice is where knowledge being gained is stored in people brains. The implication is that whenever a worker dies or leaves the organization, the knowledge gained from the project lost as they may not work together again. This agrees

with the studies by Bashir et al. (2014) where they reported that approaches used for knowledge management practices by building firms to be informal and unsystematic. It very much depends on network of individual and this has consequently affected its effectiveness and utilization. Besides, Ronald (2010) also supported the view when the study revealed that 'The problem is not a shortage of new learning and ideas, but there are no effective ways to capture these learning and ideas—and systematically do anything with them!' there is the need to find better methods, tools, and techniques to do this collectively and systematically. Zuofa et al. (2015) supported the view when asserted that the pool of knowledge is lost the fact that there are no effective ways to manage it.

Training/ E-learning that should provide a platform for people from different locations to express and exchange knowledge and ideas on any specific topic ranked 7th. In any organization, presentations use to invite the participation of people from different projects. However, it was found that the use of this knowledge management practice is not widely used in building firms. This agrees with Bashir, et al. (2014) when they reported that the attention given to Nigerian's KM practices has been weak and has consequently affected its effectiveness and utilization. One of the characteristics of training group is that it provides an indirect channel for people in different locations to share knowledge. However, this knowledge management practice is not widely used in building firms. The reason may be as a result of people preferred more direct approaches to knowledge practice. The fact is that if it is widely used in building construction firms, cohesive relationship will be established and the nature of long hours lends itself to meeting and discussing easily.

4.4 Challenges Confronting KM Practices in Building Construction Firm

Table 4.7 Challenges Confronting KM in Building Construction Firm N = 257

S/No.	Challenges to KM	SA	A	D	SD	Mean	Std.D	Rank	Decision
1.	Lack of effective communications among construction professionals	91	151	13	2	3.29	0.198	1	Agree
2.	Lack of adequate and up to date data	54	188	15	0	3.15	0.228	2	Agree
3.	Difficulty in capital valuing intellectual	76	145	35	1	3.15	0.193	2	Agree
4.	Lack of cooperation among construction professionals	62	155	27	4	3.11	0.207	4	Agree
5.	Difficulty in generating and storing KM	49	183	25	0	3.10	0.225	5	Agree
6.	Misunderstanding KM as with information management.	44	183	30	0	3.06	0.228	6	Agree
7.	Lack of time and understanding KM	52	153	50	2	3.00	0.205	7	Agree
Average Mean						3.12			Agree

(4- (SA) Strongly Agree, 3- (A) Agree, 2- (D) Disagree, 1- (SD) Strongly Disagree

Source : Field Survey (2017)

Table 4.7 shows that all the respondents agreed that items 1-7 (Mean ranged from 3.29 to 3.00) were the challenges confronting knowledge management practices in building construction firms given the overall average mean of 3.12. Lack of effective communications among the professionals top the list (mean = 3.29) followed by lack of adequate and up to date data and difficulty in capital valuing intellectual (mean = 3.15);

lack of cooperation among the construction professional (mean = 3.11); difficulty in generating and storing knowledge (mean = 3.01); misunderstanding of knowledge management as with information management (mean = 3.06) and lack of time and understanding knowledge management (mean = 3.00). This is in agreement with Moonseo, Changbum, Hyun-soo & Seungjun (2007) where the study reported that a thorough investigation of the knowledge management system users' behaviours revealed that the low usage and effectiveness of the current system were mainly due to the challenges of current knowledge management system in building construction firms.

It is one thing for knowledge to be identified, acquired and stored and a different thing to be appropriately applied in the right direction to achieve desired result. Studies have considered knowledge implementation to denote "actualization" of the knowledge (Liao & Wu, 2009; Asoh et al., 2007). It is a decision involving the use of knowledge to enhance organizational performance and goals attainment (Ghalomi et al., 2012) and should be applied at various levels or divisions in organization.

Most stakeholders are confused over information management and knowledge management. One of the most important tasks for the Corporate Knowledge Manager was to meet as many people as possible within the organization to make the concept of Knowledge Sharing "crystal clear". It means formal and informal meetings, and training sessions require putting the Knowledge Sharing subject on the agenda of top manager meetings. This will ensure understanding of knowledge management practices.

One thing that should be known is that knowledge sharing requires additional efforts. This effort may be minimized by work practices and the introduction of better knowledge

sharing techniques. Their perception is that knowledge management is an extra work and not part of their daily work environment. Employees' perceptions need to be changed for them to know that knowledge management is part of their daily work routine. They should be able to see the value added from the activities that they participate in (Du-Plessis, 2008). Besides, employees usually have no time to share and evaluate knowledge before going on to the next project. If more time were devoted between projects, individuals would have more time to collaborate and reflect on knowledge gained from the last project, resulting in a higher quality of knowledge sharing.

Furthermore, the benefits of the knowledge management practices must be understood by management and explained to the project workers. When users do not understand the benefits offered by the newly implemented systems, they only see an added responsibility or burden. Additionally, the study conducted by Chihab (2009) showed that in the absence of clear communication and guidance as to the objectives of the knowledge management practices, the negative perception of the systems overwhelmed the positive. As a result common perceptions of users participating in his study were "only people with no work will use it".

The challenge of lack of cooperation among the professionals arises out of the structural imbalance between knowledge providers and knowledge seekers. The knowledge provider, while being able to provide knowledge has little or no incentives to do so, they resulted to saying why anyone in the organization benefits from my experiences and knowledge? Why giving away the fruits of my labour for free to others? The knowledge seeker is highly incentivized to receive knowledge, but find it difficult without the cooperation of knowledge provider (Chihab, 2009). The effect of knowledge management practices in

building construction firms should be justified by differences in people's behavior during and after knowledge management, therefore measuring performance is an indicator of success.

According to Love, Fong, & Irani (2005), there are three main types of knowledge that result from project-based working: 1. Knowledge in projects which resides in project in the form of documentations, meeting, repository, and discussions 2. Knowledge about the project is knowledge that is required for executing a project and these include organizational design, designing, planning and controlling. 3. Knowledge from projects is the experiences achieved from executing project. This is in form of best practices, lessons learned, post-project reviews or after-action reviews. Unfortunately not a great deal of time is spent on the latter, as people are pulled out from a project before it is actually completed, which in turns resulting in valuable lessons from the project not being recorded and being lost.

4.5 Success Factors for KM practices in Building Construction Firms

Table 4.8 Success Factors for KM Practices in Building Construction Firms N = 257

S/No.	Factors	SA	A	D	SD	Mean	Std. D	Rank	Decision
1	Creating knowledge sharing space	178	79	0	0	3.69	0.201	1	Agree
2	Willingness to share knowledge	165	84	8	0	3.61	0.196	2	Agree
3	Top management support	97	155	5	0	3.36	0.203	3	Agree
4	Mutual Trust	92	159	6	0	3.33	0.203	4	Agree
5	Evaluation of K M process	93	157	7	0	3.33	0.202	4	Agree
6	Active participation of employees	89	161	7	0	3.32	0.204	6	Agree
7	Establishment of a Reward Strategy	74	175	8	0	3.26	0.213	7	Agree
8	Application of IT	74	149	34	0	3.16	0.195	8	Agree
	Average Mean					3.38			Agree

(4- (SA) Strongly Agree, 3- (A) Agree, 2- (D) Disagree, 1- (SD) Strongly Disagree
Source: Field Survey (2017)

Table 4.8 shows that all the respondents agreed that items 1-8 (Mean ranged from 3.16 to 3.69) were the success factors for knowledge management practices in building construction firms given the average mean of 3.38. Creating knowledge management sharing space ranked 1 (mean = 3.69).

Concerning knowledge management success factors in building construction firms, a variety of factors determine success ingredients for knowledge management practices in

construction projects in terms of these objectives. All the respondents agreed that creating knowledge sharing space (mean = 3.38); willingness to share knowledge (mean = 3.61); top management support (mean = 3.36); evaluation of knowledge management and mutual trust (mean = 3.36); active participation of employees (mean = 3.32); establishment of a reward strategies (3.26); and application of IT (mean = 3.16) are factors that contribute to the success of knowledge management.

This agrees with Chihab (2009) because the study revealed that many enterprises have a complete system of knowledge management but lack a corporate culture that supports it hence the efficiency of knowledge management is limited. It shows that successful knowledge management practices depends on the presence of corporate culture that supports knowledge management system by such organisations. The success or survival of any organization depends on how effectively such an organisation manages the knowledge. Knowledge once adequately packaged becomes the organization asset.

The willingness to share knowledge involves ability of the project stakeholders to be able to create knowledge sharing space that can considerably help and create adequate knowledge management practices in and outside the organization. Therefore there is need to create adequate space to be able to share project knowledge.

Top Management support brings about the degree of top management involving and taking knowledge management seriously. Without their support, knowledge management practices will be very difficult as this will require a huge sum of money to be able to carry out knowledge management practices successfully.

Evaluation and monitoring methods requires the evaluation of knowledge practicing/exchanging and reuse performance, well-defined procedures and responsibilities, and determining measureable goals of individual responsibilities within organization. The evaluation and monitoring process could be ensured by a team leader of knowledge management department. According to Du-Plessis (2008), the problem in the construction industry is that employees usually have no time to share and evaluate knowledge before going on to the next project.

There is the need for every project participant to trust, rely on, and understand other parties' decisions. There will be no weak links among team members if this occurs. The issues could be resolved in timely and responsive manner. It should be noted that without trust there will be no honest communication and this can hamper project knowledge sharing within the project stakeholders.

Establishment of a reward strategy involves the development of a reward strategy and mechanism for knowledge implementation, the establishment of an effective reward strategy, and the improvement of involving in knowledge management practices. In addition, this explains the commitment to improving knowledge practices within the team, receiving adequate knowledge and experience from top to bottom, support from all levels of management on the knowledge management practices.

Employees' active participation involves ability of project stakeholders to actively involve in all activities that involve knowledge management practices in the organization. For participants not being actively involved, sharing and capturing of knowledge gained by individual will be extremely difficult. The effectiveness of knowledge management

practices can be evaluated through staff involvement and motivation in projects. The greater the staff involvement, the greater the potential for knowledge transfer.

Lei-Chi et al. (2010) observed that Information Technology (IT) has long been recognized as crucial for successful knowledge management. This is probably a legacy of the growth in knowledge based system in the 80s and early 90s, and has led too much of the early work on knowledge management practices focusing on the delivery of technological solutions. While it is now recognized that good knowledge management practices does not result from the implementation of information systems. There is the need to employ the use of Information Technology (IT) in building construction firms to facilitate documentation of knowledge gained from the past projects and retrieval as well.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

The study was designed to assess the knowledge management practices of building construction firms at the project level with a view to promoting the adoption of best practice of knowledge management. This becomes necessary in view of the poor performance observed in most building construction firms. In this chapter, the summary of the findings was carried out so as to be able to draw conclusion and make recommendations.

5.1 Summary of Findings

After the analysis of the data collected, the following findings were summarized as follows:

1. Adequacy of Knowledge Management Practices

It was found that all participants indicated that knowledge management practices in building construction firms were adequate if they are properly employed and utilized. This can be possible in the presence of top management support in terms of availability of funds. If proper management techniques/practices are employed, there is no doubt that the opportunity to exchange knowledge will be considerably higher. Once knowledge is properly packaged, it becomes asset of organization

2. Extent of Adoption of Knowledge Management Practices

The results have shown that all the respondents have heard of knowledge management practices. The extent of adoption of knowledge management practices to each participant differs but all participants claimed to have high level of knowledge management practices. However, knowledge management was first established in the 1990s according to

Botha (2004). Being a new area, one can now say that the adoption level is improving, though it can be better. Training practice was not widely used while informal documentation of knowledge management practices are more used than documentation form of knowledge management practices.

3. Challenges Confronting Knowledge Management Practices

Participants identified a wide variety of factors confronting knowledge management practices in building construction firms. Participants indicate that some employees are not just willing to share their knowledge with others, because some workers regard their knowledge as solely a personal possession which gives them advantages over other workers. Other identified factors are: lack of effective communication; lack of adequate and up to date data; lack of cooperation among construction professionals; difficulty in generating and storing knowledge; misunderstanding of knowledge management as with information management; and lack of time and understanding knowledge management.

4. Success Factors for Knowledge Management Practices

Also identified by the respondents are wide ranges of factors that contribute to the success of knowledge management practices. Among others were creating knowledge sharing space; willingness to share knowledge; top management support; evaluation of knowledge management and mutual trust; active participation of employees; establishment of a reward strategies; and application of IT.

5.2

Conclusion

In the assessment of knowledge management practices by building construction firms, this study revealed that generally, there is growing recognition of knowledge management within the building construction firms. It was also found that knowledge management practices were adequate if they are employed and utilized properly by building construction firms.

It is worth noting that the adoption level of knowledge management practices by building construction firms is improving the fact that there were high level of knowledge management practices within the construction firms, though it can be better. Besides, training practice was not widely used while informal documentation of knowledge management practices are more used than documentation form of knowledge management practices.

Challenges confronting the adoption of knowledge management practices the most in the building firms is lack of effective communication among the project managers while the least is lack and understanding of knowledge management.

More so, the major factors that contribute to the success of knowledge management practices in building construction firms the most is creating knowledge sharing space followed by willingness to share knowledge, top management support and mutual trust while the least is application of IT.

One very important objectives of knowledge management are to ensure that knowledge is adequately captured for reuse as at when required. Without creating an adequate platform for capturing and sharing knowledge gained during and after project, it will be very difficult to reuse them while project knowledge gained via experiences will continue to be

lost. With the application of knowledge management, knowledge would hopefully be securely managed.

5.3 Recommendations

Based on the findings of this study, the following recommendations were made:

Though it was admitted that most construction workers are competitive by nature and would be reluctant to share the knowledge they possess, the need for sharing knowledge among the construction workers in construction firms could never be overemphasized. Besides, building construction firms need to introduce system that recognizes and appreciates workers contribution towards the knowledge management practice. Moreover, it becomes necessary to provide training support to keep construction workers abreast of relevant knowledge of past and current trends in construction firms. Construction workers development becomes necessary.

It should also be noted that prevalent culture within building firms affects knowledge management practice. For this fact, building construction firms need to grow culture such as mutual trust - honesty without which there will be no effective communication that promote and facilitate knowledge management practices. Besides, reorientation of building construction firm cultures is urgently needed. By so doing, knowledge management practices in construction firms can be entrenched more deeply in the firm. Hence providing efficiency of knowledge management practices,

It is also recommended that an attempt to incorporate both simplistic and sophisticated tools and techniques for knowledge practice should be made by construction firms to ensure efficient knowledge management practices. Today, most IT infrastructure provides

an edge in accessing knowledge gained (particularly tacit knowledge) from past project. To this end, knowledge can be easily accessed and shared among the construction employees. Thereby ensuring efficiency of knowledge management practices in the organization.

Also recommended is the use of communities of construction practices. As at present, various forums, training, meetings, conferences, working paper, libraries, and contact directories are being used by the communities of practice to disseminate their activities regularly which can propagate champion of knowledge management practices. This can be developed by construction firms as active experience and knowledge-sharing practices platform and provide invaluable insights about best knowledge management practices.

Suggestions for Further Research

1. There is need for research on knowledge management practices and the use of IT and how to make them successful.
2. There is also need to carry out research on the impact of training on knowledge management practices.

5.4 Contribution to Knowledge

The following are itemized as the possible contributions for the study has made to knowledge.

1. The research provides construction stakeholders in Nigeria with additional incites into knowledge management practices in the construction firms and strategies for its advancement in the future.

2. The research was able to identify 'lack of effective communication' coupled with lack of mutual trust that are most agreed upon by the building construction firms in Lagos State, as the challenges confronting knowledge management practice. Without honesty there will be no honest communication.

3. The study was able to identify organization corporate culture that can promote and facilitate the efficiency of knowledge management practices in construction industry. Such cultures are creating knowledge management space and willingness to share knowledge.

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APPENDIX: SURVEY QUESTIONNAIRE

AHMADU BELLO UNIVERSITY
FACULTY OF ENVIRONMENTAL DESIGN
DEPARTMENT OF BUILDING

Dear respondent,

This questionnaire is being administered as a result of a Post Graduate research work being carried out at the Department of building. It is designed to obtain relevant information on the application of knowledge management in building construction firms at the project level with a view to enhancing best knowledge management practices.

All information provided will be treated confidentially and use solely for the purpose of this research. While thanking you for your kind assistance and contribution, we look forward to receiving your responses.

.....
Olayiwola J. Osulale

08036328241

QUESTIONNAIRE

SECTION A: Personal data (Please tick)

1. Name of company (Optional).....
2. Highest qualification (e. g. Ph.D., M.Sc. B.Sc. HND
3. Years of working experience 0-5 5-10 10-15 over 15

Section B

Research Question 1.

To what extent are the usual practices of knowledge management in building construction firms?
(Please tick)

	Very high	High	Low	Very low
1. Telephone calls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Staff meeting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Libraries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Seminars/presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Conferences and events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Training/E-learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. External course	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Peer tutoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION C

Research Question 2

How adequate are the existing knowledge management tools in building construction firms?

	Very adequate	Adequate	Not adequate	Not very adequate
1. Telephone calls	<input type="checkbox"/>	<input type="checkbox"/>		
2. Staff meeting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Libraries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Seminars/presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Conferences and events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Training/E-learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. External course	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Peer tutoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PTO

SECTION D

Research Question 3.

What are the challenges confronting knowledge management practices in construction firms?

(Please tick)

		Strongly Agree	Agree	Disagree	Strongly Disagree
11.	Lack of effective communications among construction professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Lack of adequate and up to date data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Misunderstanding knowledge management as with information management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Lack of time and understanding km	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Difficulty generalizing and storing km	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Difficulty in capital valuing intellectual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Lack of cooperation among the construction professionals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION E

Research Question 4.

What are the significant success factors for knowledge management practice in building construction firms? (Please tick)

		Strongly Agree	Agree	Disagree	Strongly Disagree
1.	Creating knowledge sharing space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Application of IT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Establishment of a reward strategy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Active participation of employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Top Management support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Evaluation of knowledge management process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Mutual Trust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Willingness to share knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>