SOCIAL AND TECHNOLOGY FACTORS AFFECTING KNOWLEDGE SHARING AMONG ARCHITECTS IN ARCHITECTURAL FIRMS IN IBADAN, NIGERIA

Kemi OGUNSOLA
Africa Regional Centre for Information Science
University of Ibadan
Nigeria
Email- olukemi11@yahoo.com

and

Damilola Olanrewaju LASODE
Africa Regional Centre for Information Science
University of Ibadan
Nigeria
Email- damilolalasode10@gmail.com

ABSTRACT
Effective knowledge sharing among project members is crucial for project-based organizations in order to avoid past mistakes, improve work efficiency, and reduce failure risk of projects. Making appropriate design knowledge accessible to the right architects at the right time is central to team building and for sustaining competencies. However, despite the importance of knowledge sharing culture among design teams, members are not likely to share knowledge because of the potential threat associated with providing critical information to other design team members. This study provides answers to six research questions. Data were collected from 25 architects using one-on-one interviews, ranging from the principal architects to the trainee architects in thirteen architectural firms in the Ibadan metropolis. The study findings revealed that knowledge recovery, synergy and reciprocity are the major factors motivating knowledge sharing among the architects, while the factors inhibiting knowledge sharing are distrust, superiority complex, unwillingness to learn, over-criticism, mediocrity, treachery, and abuse of knowledge. This study therefore recommends attitudes of conflict avoidance, and suggested also that conservative habits should be eliminated to enhance effective sharing of architectural design knowledge; especially design knowledge containing some new thoughts or innovative ideas. The study further recommends that architectural firms should deploy more ICT infrastructure and services that can promote effective knowledge sharing amongst architects.

INTRODUCTION
In today's knowledge economy, firm's employees must share knowledge and indeed, such activities have become a competitive necessity. Knowledge sharing is believed to be the most important element of knowledge management, which has been shown to influence organizational outcomes, such as performance, turnover, innovativeness, and competitiveness (Daghfous, Belkhodja, and Angell, 2013; Vij and Farooq, 2014). The main goal of this study is to feature knowledge sharing as a form of collaboration that enables architects in architectural firms to reduce unwarranted disparities. Architects in architectural firms have to organize themselves to carry out their tasks, taking into consideration the trends and developments around them. Nowadays, building projects are becoming more complex, dynamic, and complicated. The performance of buildings depends heavily on the quality of its design and construction decisions. Warizi (2016) observed that despite the development in technology, residential buildings in Nigeria still suffer from defects resulting from inadequate design and construction making them vulnerable to unplanned maintenance during their life cycle. Greater part of these design and construction defects may be attributed to professionals making mistakes leading to buildings requiring constant repair and maintenance, which often translate to high cost and causing dissatisfaction to users.

Gatlin (2013) asserts that failure of the design professionals to produce complete, accurate and well-coordinated design results in defects which may be grouped under design error, omission or a combination of both. Effective knowledge sharing culture among design team members is therefore important, as this can help mitigate the influence of project design defects and complications. Babar, Gorton, and Jeffery (2005) buttress that the knowledge required to make suitable architectural choices is broad, complex, and evolving, and can be beyond the capabilities of any single architect. Sharing of knowledge between project members helps prevent repeating past mistakes in other projects. Architectural firms need to effectively and efficiently organize and manage internal process of knowledge sharing through the use of well-developed knowledge sharing approaches in order to improve their organizational performance. However, despite the importance of knowledge sharing culture among design teams, members may not likely share their knowledge because of the potential threats associated with providing critical information to other design team members. Furthermore, how organizations should encourage knowledge sharing to improve organizational performance is an important research question (Dainty, Qin, and Carrillo, 2005).

A considerable amount of scholarly literature is published on knowledge management in the construction industry context in Nigeria. Previous studies in the construction industry context have concentrated on knowledge management in general, rather than knowledge sharing specifically (Kasimu, Roslan, and Fadhlin, 2012; Oke, Ogunsemi, and Adeeko, 2013; Nzekwe, 2014). Less attention has been given to the related process of knowledge sharing specifically among the architects in the construction industry. Several studies have also been carried out on different areas in architecture in Nigeria. Arayela (2008) investigated research and development for an efficient built environment, focusing on architects. Dare-Abel (2013) studied information and communication technology (ICT) deployment in architectural firms. Oluwatayo (2014) looked at organizational structure of architectural firms and their performances. However, studies have not yet considered investigating factors influencing knowledge sharing among architects in architectural firms. Having highlighted some limitations of the literature to date, this study fills the gap by adopting a qualitative approach to investigate social and technology factors which may influence or hinder knowledge sharing among architects in architectural firms in the Ibadan metropolis.

In this study, social factors refers to the dispositions of architects towards sharing knowledge; the need to solve complex designs; past experiences of sharing knowledge; motivations to knowledge sharing; and inhibitions to knowledge sharing. Technology factors include types of ICT used for knowledge sharing and professional practice; and available knowledge resources.

Research objectives and questions

Creating an atmosphere in which knowledge will be shared is not an easy job to do. Mostly because it is commonly believed that knowledge is power only if it benefits one to acquire competitive advantage. The more valued knowledge becomes, the less it is shared because of the risk of losing the competitive advantage. The objective of this study is to find answers to the question about what factors motivate and inhibit knowledge sharing among architects in architectural firms in the Ibadan metropolis, southwestern, Nigeria. The research problem is addressed in the six research questions below:

1. What are the dispositions of architects towards sharing knowledge?
2. How has the need to solve complex designs affected knowledge sharing?
3. How have the past experiences of the architects affected knowledge sharing?
4. What are the factors motivating knowledge sharing among architects in architectural firms in Ibadan, Oyo State?
5. What are the factors inhibiting knowledge sharing among architects in architectural firms in Ibadan, Oyo State?
6. How has technology affected knowledge sharing among architects in architectural firms in Ibadan, Oyo State?

LITERATURE REVIEW

Knowledge Sharing in Project-Based Organizations

Project success depends on building an enabling environment that enhances knowledge sharing, providing organizational support and learning during project works. Boh (2007) emphasize that knowledge sharing across projects can help reduce the organizational costs of duplicating efforts for the same problem-solving. To enable an effective sharing of knowledge across projects, several knowledge-sharing mechanisms can be used. This study adopts the definition of knowledge sharing mechanisms in project-based organizations as "the formal and informal mechanisms for sharing, integrating, interpreting and applying know-what, know-how, and know-why embedded in individuals and groups that will aid in the performance of project tasks" (Boh, 2007). Knowledge-sharing mechanisms can be analyzed upon "codification versus personalization" dimensions, which distinguishes between mechanisms that enable the sharing of codified (explicit) knowledge versus tacit knowledge (Boh, 2007).

According to Almeida and Soares (2014), knowledge sharing mechanisms are implemented by means of a "people-to-document" approach which implies that knowledge is provided by the person who "knows", made independent of that person by inscribing it in a "document" and reused for various purposes by someone else who access the "document". This approach can allow people to search for and retrieve codified knowledge without having to contact the person who originally developed it. In the codification perspective, knowledge should be carefully codified and stored in databases and documents, where it can be accessed and (re)used by the employees in the organization. People can scan databases in order to get the crucial information and to find out who has done work on a topic, and then approach those people directly. ICT platforms and their components, in this perspective, can also be used to help people to communicate and share knowledge, thereby supporting the organization to focus on the dialogue between individuals. As knowledge is created and captured, organizational learning takes place and knowledge is hopefully applied and embedded within individual and organizational processes which enhance competitive advantage (Calantone, Cavusgil, and Zhao, 2002).

Bartsch, Ebers, and Maurer (2013) describe organizational learning in project-based organizations specifically as the process of making "newly created project-level knowledge available to the organization as a whole by sharing, transferring, retaining, and using it". Organizational learning is vital as previous projects present valuable experiences that could be applied in similar future projects or even generate new knowledge that could lead to new business opportunities. However, effective knowledge sharing in project-based organizations remains a challenge (Bartsch *et al.,* 2013). Almeida and Soares (2014) reported that this type of organizations poses complex problems for information and

knowledge management due to the fragmentation and lack of uniformity of organizational structures, processes, practices, and technologies.

The ineffectiveness of knowledge sharing over time, between project teams, is perhaps the most prominent issue that project-based organizations must deal with. The challenge of project-based organizations is thus to ensure effective processes of knowledge sharing and integration, within and between projects, to avoid the risk of reinventing the wheel or repeating past mistakes (Pemsel and Wiewiora, 2013). In other words, project-based organizations need to capitalize what they have learnt in each project in order to continuously improve the organizational performance (knowledge as the main resource supporting the capabilities of the organization). Trying to face this challenge, there are evidences that project-based organizations face substantial obstacles in capturing and reusing, organization-wide project knowledge (Jackson and Klobas, 2008). Furthermore, project members can have several degrees of social relationships with each other, which can pose further challenges in managing information. This view has been expressed by Ajmal, Takala, and Kekäle (2008) that different professionals have different cultures and ways of working which can be conflicting with the other participants or project culture. At the same time, project teams move from one project to another usually without the time to conveniently assimilate and document all the knowledge that was acquired during the project (Bakker, Cambré, Korlaar, and Raab, 2011). Therefore, it is important to establish an enabling environment conducive for knowledge sharing activities in order to successfully share useful knowledge among design teams.

RESEARCH METHODOLOGY

This study takes the interpretive approach with the use of semi-structured interview to understand the factors that may influence or hinder knowledge sharing among architects in architectural firms in the Ibadan metropolis of Nigeria.

Semi-Structured Interviews

Semi-structured interview entails the interviewer a list of questions on topics referred to as an interview guide (Bryman and Bell, 2007). The method is chosen due to its twofold nature: the possibility to stick to structured discussion topics and simultaneously to keep open minds and ask probing questions to retrieve the personal interpretations (Hakim, 2000; Bryman and Bell, 2011). Thus, the semi-structured interview method was used for this study.

Research Design and Data Collection

This study has been accomplished through data collection from thirteen (13) architectural firms in the Ibadan metropolis. First, trial interviews were conducted with five (5) architects in Lagos. The main goal of these trial interviews was to enable the researcher to be more specific and to prune down the interview questions in order to properly gauge the length of the interview. The semi-structured interviews are informal that give the interviewee the chance to talk freely and provide answers about their disposition towards sharing knowledge (tacit/explicit), how they solve complex design task that they don't understand or cannot solve, the knowledge source(s) they consult to solve complex design problems, their experiences observed while sharing knowledge with other members, factors influencing them to share knowledge and factors preventing them from sharing knowledge with other members as well as the ICT tools and applications used in performing their task. Appendix 1 provides an overview of the main questions used for the semi-structured

interview. The qualitative interviews are conducted face-to-face, communicating directly by the author.

An example of interview's weaknesses is that a poorly constructed interview can create bias in the interviewee's answers (Yin, 2003). An example of a research weakness highlighted by Denscombe (2007) is reflexivity, where the interviewee answers the content that interviewer wants to hear. During the interview sessions, the study participants were advised that their individual participation was voluntary and that they could discontinue participation at any time. Furthermore, the study participants were not paid for their participation.

Interviews were conducted with 25 architects in thirteen (13) different architectural firms. The 25 architects interviewed were the Principal architects (5 participants), Senior architects (9 participants), Junior architects (7 participants) and Trainee architects (4 participants). Permission was obtained from the respondents to record the interview sessions. The structured interview was digitally recorded for accuracy so that any extra information that was not noted down at the time of the interview could be later transcribed for further analysis. According to Gray (2004, p. 227), the use of tape recording is vital in conducting interviews as it helps the researcher record essential data, while permitting them to concentrate on the process of listening, interpreting and re-focusing the interview.

Qualitative Analysis

There are different types of qualitative data analysis have been used across various areas of research. The two most popular types of qualitative data analysis are content and thematic analysis (Braun and Clarke, 2006). They are both used to develop a framework for describing and organizing qualitative data (Patton, 2002). In this study, the thematic analysis was used to analyze the qualitative data. Thematic analysis includes organizing principles within data into sub-themes according to their similarities. There are a variety of steps and phases used to perform thematic analysis (Braun and Clarke, 2006). For the purpose of this study, three steps were applied following those of Braun and Clarke (2006).

- Generating themes.
- Searching for themes.
- Reviewing and developing themes.

Generating themes

There are two methods that can be used to generate themes, namely the manual and computer-assisted methods. In this study, the manual method was used as it allows more flexibility and also makes it easier to get the big picture from the data obtained. To generate the sub-themes, multiple readings of the transcripts were undertaken to allow the development of principles and constructs regarding potential sub-themes. The next section presents the results of searching for themes, through interview quotes, to gather interview-based sub-themes.

Searching for Themes

This section discusses some of the research findings derived from the analysis of the interview data. These findings emerged from the process of reading and reviewing of text segments. The collected sub-themes were grouped into themes. The themes and sub-themes identified can be shown in Table 1.

Table 1: List of themes and sub-themes

Themes	Sub-themes
Disposition Towards Sharing Knowledge	Positive Disposition
	Constructive Criticisms
	Tacit and Explicit Knowledge
Solving Complex Designs	Brief
	Case Studies
	Developing Social Ties
Experiences Observed	Pleasant Experience
	Unpleasant Experience
Factors Motivating Knowledge Sharing	Knowledge Recovery
	Synergy
	Reciprocity
Factors Inhibiting Knowledge Sharing	Treachery
	Distrust
	Unwillingness to Learn
	Superiority Complex
	Over-criticism
	Mediocrity
	Abuse of Knowledge
Technology	Type of ICT for Knowledge Sharing and Professional Practice
	Knowledge Sources

DATA ANALYSIS

This section presents the findings of the qualitative data analyzed using thematic methods explained in the data analysis section. A thematic analysis of semi-structure interviews with the architects in thirteen (13) architectural firms, namely; International Architects, Masad Architectural Consult, CAS Architects, Mobolaji Adeniyi and Associates, Archifact Architects, Desired Choice Step Limited, Archifad Consultants, Make-E Consult, Sukky Architects, Design Trend Limited, Dimfal Associates, Doro Associates and Oluwilson Consult were conducted.

Research question 1: What are the dispositions of architects towards sharing knowledge?

This theme highlights the positive disposition to sharing knowledge, tacit and/or explicit knowledge and constructive criticisms culture as observed by majority of the study participants.

Positive Disposition

Respondents interviewed perceived knowledge sharing as a good act that should be a day to day activity in architecture. Respondents mostly have had a positive disposition to knowledge sharing. Furthermore, some respondents also revealed the common culture in architectural firms that enhances knowledge sharing and which is expected to yield good design outputs or improvements in designs. The following quotes highlight two participants' perception about the importance of knowledge sharing in architecture.

> One of the respondents noted: "*Knowledge sharing forms the nucleus of this profession because from training to practice, there is no way you can do away with it. If you don't share knowledge, you cannot be able to interact with others and if you don't share knowledge most especially in architecture, you will find it difficult to make headway (Respondent 16, Principal Architect**)**".*
>
> Another respondent opined: *"Architecture is a knowledge intensive business which makes it different from other professions and it is not a kind of profession where an individual can just decide to practice alone (Respondent 9)".*

Constructive Criticisms

Constructive criticisms on project designs in architecture has also put in place effective knowledge sharing in which faults or errors are identified in designs and ideas are shared which is expected to bring more improvements to the particular project.

> One respondent opined: *"Architecture is about criticism. The criticism is meant to help you improve on the design. Criticism in architecture makes design competitive and also makes design more effective (Respondent 23, Principal Architect)".*
>
> Another respondent noted that: *"Every architect has his/her perspective about a particular design and that is why at any point in time in a design, we tend to have what we call 'jury'. Jury is an environment whereby an architect presents his/her work, thoughts, and how an architect feels about a particular design. It means an architect is open to 'constructive criticisms' from other architects on a particular design (Respondent 20, Senior Architect)".*

Tacit/Explicit Knowledge

Most of the respondents interviewed revealed that architecture requires sharing more of tacit knowledge than the explicit knowledge. These responses below show that architecture is much more about *'creativity'* and the knowledge that architects possess is largely experience-based, tacit, and embedded within the design and construction process.

> One respondent said: "*Architecture is such a very wide profession that it gives room for flexibility. The more flexible you are, the better your designs will be. In other words, it gives room for you to share your tacit knowledge than the explicit knowledge (Respondent 20, Senior Architect)".*
>
> Another respondent noted: *"In architecture, most of our works are more of creativity in form of bringing an idea to reality which is more tacit in nature. As a firm, we usually work together as a team. As long as you are within your team, knowledge is easily shared. But if it is outside the firm, knowledge must be kept secret. We architect do compete, so we cannot be telling others about our secrets. There is an aspect of intellectual property in architecture which is very important and this must be kept within the firm (Respondent 8, Senior Architect)".*

Another respondent noted: *"We share knowledge on practical basis. For instance, when you design building, other architects will not know how it came about, so you have to share knowledge and explain how it was made (Respondent 17, Junior Architect)".*

Research question 2: How has the need to solve complex designs affected knowledge sharing?

This theme highlights the participants' views on how they fix complex design problem(s) they don't understand or design problem(s) they cannot solve. Three (3) major activities were further identified by the researcher based on insights gained from the activities usually undertaken by architects in solving complex designs and these are as follows:

Brief

This involves collecting or documenting detailed information on the exact needs of the client's proposed project. One respondent said:

"*Complexity arises when the need of the client is so enormous. The site of the client itself, the site environment and other factors could bring in many complications which just have to be solved through critical thinking when designing the project. An architect will need to involve the services of other colleagues in order to totally capture the brief needed to evolve a design that will satisfy the client's need. This is where knowledge sharing comes in. (Respondent 8, Senior Architect)".*

Another respondent opined: *"There shouldn't be any difficulty if you are properly briefed by the client and you know what the client wants concerning that project, but I don't think there should be any problem except the physical complex problems. This is because whatsoever the mind can conceive, the mind should be able to achieve, unless you create a complex situation for yourself as a designer. (Respondent 22, Principal Architect)".*

Case Studies

This involves carrying out an in-depth research or study of a particular project that is similar to a design project done before. One respondent revealed:

"I carry out case studies which is the most important thing in architecture. There is no way you can design something new, there is always someone who has done it before (Respondent 14, Senior Architect)".

Another respondent opined: *"Anytime I have complex designs like that, it's either I consult a senior colleague or I will rather go online to do my case studies. Case study means to check online for a similar project that has been done before. Then from there, I get ideas on what next to do (Respondent 24, Junior Architect)".*

One respondent noted: *"I carry out case studies even if it requires traveling to a similar project already completed (Respondent 12, Junior Architect)".*

Developing Social Ties

Research has shown that if competition between members is minimized, the motivation for cooperation and sharing knowledge is higher. It is especially critical for project based organizations to share knowledge among project members within an organization in order to avoid similar mistakes and improve work efficiency. One respondent opined:

"We do everything together to get problems solved. Depending on the type of challenge; sometimes we seek knowledge from colleagues outside the firm but most of the time we solve them on our own. If it is a design problem that is solvable, we discuss this problem within other architects. Each school of thought is brought into the design and we try to harmonize thoughts, and by that, we get problem solved (Respondent 20, Senior Architect)".

Another respondent opined: *"That's why they say two heads are better than one. The only solution to this kind of problems is to ask questions and ask a senior colleague who might have designed something similar (Respondent 14, Senior Architect)".*

One respondent noted: *"I seek for help from superior colleagues. You just have to humble yourself and seek information from them (Respondent 18, Junior Architect)".*

Research question three: How have past experiences of the architects affected knowledge sharing?

This theme highlights the participants' views on the pleasant and unpleasant experiences encountered while sharing their knowledge to other colleagues in the firm.

Pleasant Experience

Experiences gained through knowledge sharing varied among respondents, for some it has been useful. Some think sharing knowledge is interesting. One respondent opined that:

"*Personally, I like to solve problems and it makes me fulfilled so it is always a great feeling when I help others by sharing my knowledge and my knowledge is put into practice. It is always a good experience when you are in a position to share your knowledge and you see your knowledge been taken, and you can also see the positive results of your knowledge shared (Respondent 20, Senior Architect)*".

One respondent also noted: *"I have never had a bad experience when sharing knowledge because personally, I like sharing knowledge and giving out knowledge (Respondent 12, Junior Architect)".*

Unpleasant Experience
Some have had unpleasant experiences where they have shared their knowledge and it wasn't received well. According to one respondent:

> *"Many senior colleagues look down on junior and upcoming architects. For instance, I worked with a colleague of mine in Lagos. He is my senior. There was a problem with the Building Information Modeling (BIM) in the stair case of the design he made and I was trying to correct him for the mistake he made. He refused to yield to my advice. After seven days, the stair case collapsed. I mean it came down. He later remembered my advice and called me for help. My idea was adopted and so we did it (Respondent 17, Junior Architect)".*

> Another respondent opined: *"Sometimes when you work with some people, they may be threatened, having a feeling that they are been outshined (Respondent 3, Trainee Architect)".*

Research question four: What are the factors motivating knowledge sharing among architects in architectural firms in Ibadan, Oyo State?

This theme highlights the factors obtained from the interview where respondents identified what factors motivates them to share knowledge within the firm. From the interview, similar responses were grouped together and the main factors that emerged include:

Knowledge Recovery
Some respondents reported that sharing knowledge with other members has enabled them to recover or remember their knowledge lost or forgotten. This may be due to the nature of architecture as it requires vast amount of knowledge which must be mastered and utilized during project work.

> One respondent stressed that: *"It is very good to share knowledge with people because someone can easily remember the things he/she has forgotten while sharing knowledge with others (Respondent 13, Senior Architect)".*

> Another respondent noted: *"If we share the same views, I will be very glad to share knowledge because I am open to sharing knowledge. (Respondent 14, Senior Architect)".*

> One respondent also opined: *"Sharing knowledge makes me recapture what I already know before, and to get knowledge from them because if you don't teach them, they will also not teach you (Respondent 4, Trainee Architect)".*

Synergy
Team work at its best results in a synergy that can be very productive and also improves organizational learning. Synergy involves the combined actions or power of individuals or group of individuals when working together that is greater than the power achieved by each individual working separately.

> One respondent noted: *"It feels good when you share your knowledge with others who knows better than you and that is when you are able to move forward (Respondent 23, Principal Architect)".*
>
> Another respondent noted: *"Sharing knowledge helps to develop others. I also want other junior architects to learn from my experience. There is no point having junior colleagues if you cannot develop them to your standard and help them to reach their goal. Except if I share the knowledge and it is abused, it discourages me and next time* I keep my knowledge (Respondent 22, Principal Architect)".

Reciprocity

The practice of sharing knowledge with others and receiving knowledge for mutual benefit also helps increase the knowledge of both parties.

> One respondent opined: *"There is a way I feel when my colleagues share knowledge because it makes me want to reciprocate. I think the issue of knowledge sharing should be part of our academic ethics. The whole point of academics is to impact knowledge, and as career-minded people who have been to school, I think it should be part and parcel of us to be able to impact knowledge whether someone else share or does not share knowledge (Respondent 10, Senior Architect)".*

Research question five: what are the factors inhibiting knowledge sharing among architects in architectural firms in Ibadan, Oyo state?

This theme highlights the factors obtained from the interview where the respondents identified factors preventing them from sharing knowledge. From the interview, similar responses were grouped together and the main factors that emerged include:

Treachery

Violation of faith, deceit, betrayal or abuse of trust, has shown to discourage people from sharing knowledge.

> One respondent revealed: *"Some people betray others; therefore people are not encouraged to share knowledge. (Respondent 12, Junior Architect)".*
>
> One respondent also emphasized: *"One of the clauses in sharing knowledge is that you may know something that your colleagues don't know and they might feel proud to come to you for assistance. Instead of asking you about it, they may end up disregarding or mocking you at end of the day (Respondent 5, Trainee Architect)".*

Distrust

The feeling that the other party cannot be relied upon, or the doubt of the honesty of the other party has been shown to restrain some of the respondents from sharing knowledge.

One respondent revealed: *"I keep my knowledge to myself because in Nigeria today, if knowledge, ideas and secrets is exposed to someone else, (1) they may use it against you (2) they may quickly apply the knowledge and achieve substantial result more than you (Respondent 7, Principal Architect)".*

One respondent noted: *"When the person has no trust in you or discourages you all the time; especially if the person will betray you, you will be prevented from sharing knowledge with such people (Respondent 11, Junior Architect)".*

Unwillingness to Learn

Some of the respondents have noted that people may be ignorant and not willing to learn especially when they perceive that the other party knows much more than them.

According to one respondent: *"The fact that some colleagues are not willing to learn, or feeling that they know it all, are some of the reasons that discouraged me from sharing knowledge (Respondent 18, Junior Architect)".*

One respondent noted that: *"There are some people that want to learn but to approach you is difficult. They won't come to meet you. They have a feeling of self-sufficiency (Respondent 6, Trainee Architect)".*

Superiority Complex

Having what is thought to be a profound level of understanding in a subject that often makes a person feel superior to others, giving them a sense of self-importance. It is also a belief that one is better or more important than other people.

One respondent noted: *"One thing about architecture is that you cannot know everything. Many people want to show that they are better than others, and we discovered that some people were getting the scores and some were lagging behind. People must realize that nobody is an island of knowledge, you just have to share knowledge (Respondent 12, Junior Architect)".*

One respondent stressed that: *"There are some people that don't like communicating and it would be as if you are disturbing them whenever you are trying to solicit for or obtain knowledge from them (Respondent 14, Senior Architect)".*

Another respondent revealed that: *"Some colleagues are pompous and greedy. They act like they are the only ones that know it all. I don't mix with such colleagues (Respondent 4, Trainee Architect)".*

Over-Criticism

Over-criticism in designs has also been notified by one of the respondents as a factor restraining the individual from sharing knowledge with others.

One respondent noted: *"The only factor that discourages me from sharing knowledge has to do with over-criticism from my colleagues, which means I*

am being over criticized unnecessarily which might be in a bid to mock me for my design (Respondent 8, Senior Architect)".

Mediocrity

The condition of being mediocre, that is having only an average degree of quality or skills have also been identified affecting knowledge sharing among some of the respondents:.

One respondent noted: *"When sharing knowledge, you expect to get some responses. But if that person responds and there is no substance in his/her response, it becomes a critical factor for future sharing. I cannot continue to share my knowledge with someone who has no idea (Respondent 23, Principal Architect)".*

One respondent noted: *"I love sharing with intelligent people. They are the best of my peers. Because when discussing with a colleague and I see his or her level of versatility, I will like to share. But what will put me off is when we are discussing and there is no connection in the discussion or the other party is saying something that lacks relevance (Respondent 17, Junior Architect)".*

Abuse of Knowledge

Abuse of knowledge involves using knowledge to achieve a negative end; or using knowledge as a means to somehow demean or diminish others. This aspect has also been identified to restrain people from sharing knowledge.

One respondent revealed: *"We architects are familiar with one another within the profession, but I know who I can go to and I know who I should not go to. Some people will want to take that job from you and I know some of them. If you go and share with those people, the next thing you will see is that they steal that job or contract from you (Respondent 23, Principal Architect)".*

Research six:How has technology affected knowledge sharing among architects in architectural firms in Ibadan, Oyo State?

This theme highlights the use of ICT for knowledge sharing and ICT for professional practice. The interview shows that different technological means and tools are used daily by the architects in order to share knowledge and for professional practice in order to accomplish different design task. The respondents mostly attributed a positive role to the technology.

ICT for Knowledge Sharing and Professional Practice

The interview indicates the patterns of communication through ICT for facilitating knowledge sharing among the architects and the use of ICT for professional practice being significant for developing members' professionalism. One respondent noted:

"On the issue of sharing knowledge via ICT, we frequently use e-mails and mobile phones which are the major means of communication as well as social

media platforms like our Whatsapp office group and so on. For performing design task, we use majorly the AutoCAD for 2D drafting, Revit for 3D modeling, Corel draw, Photoshop and Adobe illustrator for blending the design, and Microsoft PowerPoint for design presentations. (Respondent 1, Senior Architect)".

One respondent also noted: *"When it comes to sharing information and documents, emails, chat rooms are platforms we use a lot. We use AutoCAD, Revit and other tools for designing projects (Respondent 16, Principal Architect)".*

Most of the respondents interviewed revealed that ICT has tremendously improved their work giving various scales ranging from 8 to 10. For instance, one respondent noted:

"I give it 100%. ICT has really reduced our effort; we get better output. My 5 hours on manual drawing board equals 25minutes using ICT (Respondent 1, Senior Architect)".

Knowledge Sources

Most of the respondents revealed that they consult the '*Architectural-Data'*, also known as the '*Archi-data'* and likewise the *'Timesaver'*. The Archi-data and Timesaver serve as a common guide to all architects ant it provides them with a solid foundation for planning and designing projects. Some respondents also revealed that they surf the Internet for relevant design materials. For instance, one respondent noted:

"*I visit websites like chaosgroup.com, evermotion.org to download relevant architecture e-books and materials and YouTube videos tutorials. I usually see solutions online to most of the design problems I have encountered and thereafter solve them. (Respondent 18, Junior Architect)".*

DISCUSSION

Disposition towards knowledge sharing and solving complex designs

In order for knowledge sharing to occur as depicted in the study findings, members within the architectural firms must participate in discussions, contribute knowledge and innovative ideas as well as provide visibility within the respective firms. In other words, knowledge sharing creates a participative climate favouring continued knowledge sharing (Styhre, 2011). The study findings have revealed that the common practice in architectural firms, such as constructive criticisms (jury) on project designs has also put in place effective knowledge sharing, in which faults or errors are identified in designs and ideas are shared in order to bring more improvements to the particular project design. This finding is in line with literature stressing that the common ground and shared practice, co-created through interaction, is said to facilitate knowledge sharing (Cramton, 2001;

Duguid, 2005). Knowledge sharing is a key process for communities to be able to enhance each other's professionalism, improve practice and develop coherence in the community (Duguid, 2005).

Factors motivating knowledge sharing

As outlined in the introduction, the main purpose of this study is to identify factors that motivate and inhibit knowledge sharing among architects in architectural firms in the Ibadan metropolis of Nigeria. The findings below show that a number of factors have the potential to either facilitate or hamper knowledge sharing.

a. Knowledge recovery

The qualitative study has identified different enablers and barriers to knowledge sharing among the study respondents. Knowledge recovery has been identified as an important factor encouraging the study participants to share knowledge with other members within the firm. Some respondents revealed that sharing knowledge has enabled them to recover or remember their lost knowledge or forgotten knowledge. This finding concur with literature, stressing that knowledge recovery is a new term that can be used to regain information, to find out about memories and about identities of artifacts (Sulaiman and Burke, 2011).

b. Synergy

Synergy is a very essential part of workplace success such that when employees work together to accomplish a goal, everyone benefits from the exercise. Findings revealed that synergy is an important factor influencing knowledge sharing among architects within the firms in the Ibadan metropolis. This finding is consistent with Randolph (1995), who observed that teams with the structure of creating synergy, create significant knowledge and also serve as a mechanism to provide support to the empowered personnel. This finding also concur with literature stressing that an organizational climate that emphasizes individual competition may pose a barrier to knowledge sharing whereas cooperative team perceptions help create trust, a necessary condition for knowledge sharing (Schepers and Van den Berg, 2007).

c. Reciprocity

The qualitative analysis has revealed that when architects feel that sharing knowledge can lead to future requests for knowledge being met, they will be more inclined to participate in knowledge sharing activities. According to Davenport and Prusak's (1998) idea of knowledge market, reciprocity is one of the factors that drive knowledge sharing. This finding corroborates with previous studies, such as Kankanhalli, Tan, and Wei (2005), and Wasko and Faraj (2005) who revealed that knowledge sharing in organizations is facilitated by a strong sense of reciprocity.

Factors inhibiting knowledge sharing

a. Treachery

The process of being deceptive or an action in which someone betrays another individual who trust them, has been identified based on the findings as an important factor discouraging some respondents from sharing their knowledge with others. According to social exchange theory, individuals may change their attitudes or behaviours, depending on how they perceive they are being treated or on the need for reciprocity (Blau, 1964; Cropanzano and Mitchell, 2005). The study findings corroborate Kim, Kim, and Yun

(2015), who discovered that abused employees, may readily decide to decrease their knowledge sharing efforts, as a means of restoring the control they have lost.

b. Distrust

Another personal barrier to knowledge sharing is distrust. The qualitative analysis has uncovered insights that some study participants do not trust their colleagues. Although, it is a known phenomenon that people need to trust each other in order to share knowledge, but when some architects perceived trust among one another as purely a social norm, it might not influence knowledge sharing among them. This finding corroborates Zaglago, Chapman, and Shah (2016), who discovered that mistrust among designers may rise from perceptions that others are not contributing equally to the team or that others might exploit their own design engineer's cooperative efforts.

c. Unwillingness to learn

Being ignorant and not willing to learn has been identified based on the study findings as a factor restraining some of the respondents from sharing knowledge with other members. This may be due to lack of time to engage in knowledge sharing among colleagues or lack of awareness of the benefits that can be derived from sharing knowledge with others. This finding agrees with Riege (2005), who observed that barriers to knowledge sharing include general lack of time to identify team in need of specific design knowledge and lack of contact time and interaction between design knowledge sources and recipients.

d. Superiority complex

One major inhibitor affecting knowledge sharing is that knowledge can be considered a source of power and superiority (Gupta and Govindarajan, 2000; Kim and Mauborgne, 1998). This finding agrees with Sackmann and Friesl (2007), who observed that unwillingness to share knowledge may be due to fear that one is giving out what makes one a powerful engineer, or from a desire to prevent co-engineers gaining access to one's knowledge.

e. Over-criticism

Among the barriers to knowledge sharing, over-criticism has also been identified as an important factor preventing knowledge sharing. Team members may be reluctant to share knowledge if they fear criticism from their peers or recrimination from their management. Similar result is also found in Awang, Kareem, and Ismai (2014), who discovered that junior teachers were more worried about their suggestions not being accepted due to lack of experience and being novices in the teaching profession and that they feel inferior speaking in front of their seniors for fear of ridicule and criticism.

f. Mediocrity

The study findings have also revealed that low level of knowledge or skills is important factor discouraging knowledge sharing among some of the study participants. This factor may sometimes discourage people from sharing knowledge with others who have little or no knowledge. This finding agrees with Paulin and Suneson (2012), who addressed this finding in their study on knowledge transfer, knowledge sharing and knowledge barriers, that knowledge barriers seem to be applied from at least three different views. This include; (1) not enough knowledge depending on the level of education in a certain area or about a particular topic, (2) the perceptual system in a specific human or group of

humans does not contain enough contact points, or does not fit incoming information to utilize it and convert the information to knowledge, and (3) lack of knowledge about something depending on barriers for knowledge sharing or transfer.

g. Abuse of knowledge

Using knowledge to achieve a negative end or using knowledge as a means to somehow demean or diminish others has shown to be an important factor discouraging knowledge sharing among architects in the Ibadan metropolis. This sometimes happen when people have acquired knowledge and they begin acting as if they are bigger than everyone all of a sudden. This finding corroborates Zhang and Sundaresan, (2010), who found out that individuals perceive sharing of knowledge as a risky behaviour since knowledge shared might be misused, mishandled or imitated by others and subsequently affect their status or advantages in the organization.

CONCLUSION AND RECOMMENDATIONS

The study findings revealed that knowledge recovery, synergy and reciprocity are the major factors motivating knowledge sharing among architects, while the factors inhibiting knowledge sharing are distrust, superiority complex, unwillingness to learn, over-criticism, mediocrity, treachery, and abuse of knowledge. Identifying these challenges, discussing their impacts and suggesting some management practices that may address those challenges are therefore crucial. Based on the findings, the following recommendations were made for those initiating or striving to promote knowledge sharing in their various firms. This study recommends that attitudes of conflict avoidance should be encouraged among architects. Moreover, conservative habits should be eliminated in order to enhance sharing of design knowledge among architects. This study also recommends that architectural firms should create enabling environment that is conducive for successful cooperation in which architects can feel safe in displaying behaviour that can enhance knowledge sharing. The study further recommends provision of organizational knowledge repositories, where knowledge resources may be stored and consulted when needed. ICT infrastructure and services that encourage effective knowledge sharing should also be adopted.

REFERENCES

Ajmal, M. M., Takala, J., and Kekäle, T. (2008), "Role of organizational culture for knowledge sharing in projects", *In PICMET 2008 Proceedings, Cape Town, South Africa, July 27-31,* pp. 962-968.

Almeida, M.V., and Soares, A.L. (2014), "Knowledge sharing in project-based organizations: Overcoming the informational limbo", *International Journal of Information Management*, 34(6),770-779.

Arayela, O. (2008), "Research and development for an efficient built environment in Nigeria", *In Proceedings of Architects' Colloquium 2008 Conference, Musa Yar'Adua Centre, Abuja,* pp. 123-135.

Awang, M., Kareem, O. A., and Ismai, R. (2014), "Sharing is caring. Why do we have barriers in knowledge sharing?", *The Online Journal of Distance Education and e-Learning,* 2(2), 26-33.

Bakker, R. M., Cambré, B., Korlaar, L., and Raab, J. (2011), "Managing the project learning paradox: A set-theoretic approach toward project knowledge transfer", *International Journal of Project Management,* 29(5), 494-503.

Bartsch, V., Ebers, M., and Maurer, I. (2013), "Learning in project-based organizations: The role of project teams' social capital for overcoming barriers to learning", *International Journal of Project Management,* 31(2), 239-251.

Blau, P. (1964), *Exchange and Power in Social Life.* New York: Wiley.

Boh, W. F. (2007), "Mechanisms for sharing knowledge in project-based organizations", *Information and Organization,* 17(1), 27-58.

Braun, V., and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology,* 3(2), 77-101.

Bryman, A., and Bell, E. (2011), *Business Research Methods,* Oxford: Oxford University Press.

Bryman, A., and Bell. E. (2007), *Business Research Methods,* 2nd ed., Oxford: Oxford University Press.

Calantone, R. J., Cavusgil, S. T., and Zhao, Y. (2002), "Learning orientation, firm innovation capability, and firm performance", *Industrial Marketing Management,* 31(6), 515-524.

Cramton, C. D. (2001), "The mutual knowledge problem and its consequences for dispersed collaboration", *Organization Science,* 12(3), 346-371.

Cropanzano, R., and Mitchell, M. S. (2005), "Social exchange theory: An interdisciplinary review", *Journal of Management,* 31(6), 874-900.

Daghfous, A., Belkhodja, O., and Angell, L. C. (2013), "Understanding and managing knowledge loss", *Journal of Knowledge Management,* 17(5), pp. 639-660.

Dainty, A.R.J., Qin, J., and Carrillo, P.M. (2005), "Hrm strategies for promoting knowledge sharing within construction project organisations: A case study", In Kazi, A.S. (Eds.) *Knowledge Management in the Construction Industry: A Socio-Technical Perspective.* Hershey, PA: Idea Group, pp. 18-33.

Dare-Abel, O.A. (2013), "Information and communication technology (ICT) deployment in architectural firms in Nigeria", (Doctoral dissertation), Covenant University, Ota, Nigeria.

Davenport, T. H., and Prusak, L. (1998), *Working Knowledge: How Organisations Manage What They Know,* Harvard Business School Press Boston, MA.

Denscombe, M. (2007), *The Good Research Guide for Small-Scale Social Research Projects,* Maidenhead: Open University Press.

Duguid, P. (2005), "The art of knowing: Social and tacit dimensions of knowledge and the limits of the community of practice", *The Information Society,* 21(2), 109-118.

Gatlin, F. (2013), "Identifying and managing design and construction defects", *Construction Insight from Hindsight,* No. 5, pp. 1-11.

Gray, D.E. (2004), *Doing Research in the Real World.* Sage. p.108.

Gupta, B., Iyer, L.S., and Aronson, J.E. (2000), "A study of knowledge management practices using grounded theory approach", *Journal of Scientific and Industrial Research,* 59(4), 668-672.

Hakim, C. (2000), *Research Design: Successful Designs for Social and Economic Research,* London: Routledge.

Jackson, P., and Klobas, J. (2008), "Building knowledge in projects: A practical application of social constructivism to information systems development", *International Journal of Project Management,* 26(4), 329-337.

Kankanhalli, A., Tan, B.C.Y., and Wei, K.K. (2005), "Contributing knowledge to electronic knowledge repositories: An empirical investigation", *MIS Quarterly,* 29(1), 113-145.

Kasimu, M.A., Roslan, A., and Fadhlin, A. (2012), "Knowledge management model in civil Engineering construction firms in Nigeria", *Interdisciplinary Journal of Contemporary Research in Business,* 4(6), 936-950.

Kim, S. L., Kim, M., and Yun, S. (2015), "Knowledge sharing, abusive supervision, and support: A social exchange perspective", *Group & Organization Management,* 40(5), 599-624.

Kim, W.C., and Mauborgne, R. (1998), "Procedural justice, strategic decision making and the knowledge economy", *Strategic Management Journal,* 19(4), 323-338.

Nzekwe, K.C.L. (2014), "Assessment of organisational leadership for knowledge management practice in the Nigerian construction industry", (Doctoral Dissertation), Ahmadu Bello University, Zaria, Nigeria.

Oke, A. E., Ogunsemi, D. R., and Adeeko, O. C. (2013), "Assessment of knowledge management practices among construction professionals in Nigeria", *International Journal of Construction Engineering and Management,* 2(3), 85-92.

Oluwatayo, A.A., and Amole, D. (2014), "Organizational Structure of Architectural Firms and Their Performances", *International Journal of Construction Engineering and Management,* 3(1), 1-12.

Patton, M. Q. (2002), *Qualitative Research and Evaluation Methods,* 3rd ed., Sage Publications, Thousand Oaks, CA.

Paulin, D., and Suneson, K. (2012), "Knowledge transfer, knowledge sharing and knowledge barriers – Three blurry terms in KM", *The Electronic Journal of Knowledge Management,* 10(1), 81-91.

Pemsel, S., and Wiewiora, A. (2013), "Project management office a knowledge broker in project-based organisations", *International Journal of Project Management,* 31(1), 31-42.

Randolph, W.A. (1995), "Navigating the journey to empowerment", *Organizational Dynamics,* 23(4), 19-32.

Riege, A. (2005), "Three-dozen knowledge sharing barriers managers must consider", *Journal of Knowledge Management,* 9(3), 18-35.

Sackmann, S.A., and Friesl, M. (2007), "Exploring cultural impacts on knowledge sharing behaviour in project teams: Results from a simulation study", *Journal of Knowledge Management,* 11(6), 142-156.

Schepers, P., and van den Berg, P. T. (2007), "Social factors of work-environment creativity", *Journal of Business and Psychology,* 21(3), 407-428.

Styhre, A. (2011), *Knowledge Sharing in Professions: Roles and Identity in Expert Communities*, Gower Publishing, Ltd.

Sulaiman, N. I. S., and Burke, M. E. (2011), "Global perspectives on knowledge sharing: investigating malaysian online community behaviour", *In 11th International Conference on Knowledge Culture and Change in Organisations.*

Vij, S., and Farooq, R. (2014), "Knowledge sharing orientation and its relationship with business performance: A structural equation modeling approach", *IUP Journal of Knowledge Management,* 12(3), 17-41.

Wasko, M. M., and Faraj, S. (2005), "Why should I share? Examining social capital and knowledge contribution in electronic networks of practice", *MIS Quarterly,* 29(1), 35-57.

Waziri, B. S. (2016), "Design and construction defects influencing residential building maintenance in Nigeria", *Jordan Journal of Civil Engineering,* 10(3), 313-323.

Yin, R. K. (2003), *Case Study Research - Design and Methods*, (3rd ed.). London: SAGE Publications.

Zaglago, L., Chapman, C., and Shah, H. (2016), "Barriers to knowledge sharing culture among design team", *In Proceedings of the World Congress on Engineering*.

Zhang, Z., and Sundaresan, S. (2010), "Knowledge markets in firms: Knowledge sharing with trust and signalling", *Knowledge Management Research & Practice,* 8(4), 322-339.

Appendix 1: Themes of the Interviews

1	**Disposition Towards Sharing Knowledge** Some people think knowledge sharing is good and it helps to attain competitive advantage while some consider it to be bad, I would like to know your disposition to sharing knowledge (explicit and tacit) with your colleagues in this profession in your firm?
2	**Solving Complex Designs** When faced with complex design task at work, how do you fix this design problem(s) you don't understand, or design problem(s) you cannot solve?
3	**Experience Observed** Please describe your own experience while sharing knowledge with your colleagues in the firm?
4	**Factors Motivating Knowledge Sharing** What are the factors motivating knowledge sharing among architects in the firm?
5	**Factors Inhibiting Knowledge Sharing** What are the factors inhibiting knowledge sharing among architects in the firm?
6	**Technology** a. What kind of ICT tools/applications do you use in performing your task as an architect?