IMPORTANCE OF KNOWLEDGE CAPTURING (KC) IN THE DESIGN BRIEFING PROCESS IN THE CONSTRUCTION INDUSTRY

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ABSTRACT

Construction is a major contributor to UK GDP (directly 8.5% in 2008, rising to 10% overall when the entire value chain is considered) and a driver of historical GDP growth. The sector employs over 3 million people in a multitude of roles representing 8% of UK employment and a significant proportion of construction employees. The construction industry operates in stages and one of which is the pre-design stage. The pre-design stage is an important phase of the construction process because this is where the client brief is written up and major decisions are made. An effective client briefing process is important to the attainment of client objectives with respect to time, cost and quality for construction projects. Through a critical review of literature. Research shows that despite several research conducted in the area of knowledge management, it has unfortunately, not been matched by parallel empirical research on the processes, challenges and benefits of knowledge capture (KC) in the design briefing process within the construction industry. As a result of this, many projects end up under performing and not matching up to the expected goals and objectives highlighted by the client. This goes on to ascertain that inadequate attention given to the knowledge capturing process during the design briefing can be a major deterrent to the output of a construction project which can in turn lead to highly dissatisfied clients and loss of contract for some organizations. This paper presents the importance and likely barriers associated with knowledge capturing during the client briefing process and the impact poorly run design briefing process has on the output of a construction project.

Key words: Design briefing, Knowledge capturing, Requirement elicitation

1. Introduction

Inadequate time given to the briefing process is partly one of the major reasons responsible for the level of client dissatisfaction with the construction of buildings in the construction industry (Olusegun and Omodunbi, 2008; Bowen et al., 1997). The concept of briefing is regarded as being one of the most critical and important factors in determining client's satisfaction and project performance. Given the apparent importance of the briefing process for project success and the project teams' inability to properly ascertain the client's needs, the question arises: what factors militate against effective project briefing? The development of the design brief is a process of clarifying the objectives and requirements of a project from the client's perspective. One of the fundamental objectives of the requirement elicitation process in the design briefing stage is for clients to communicate to the design team and specialist consultants their needs and objectives in initiating the project (Bowen, 1999), the emphasis being on the objectives of the client rather than on the provision of solutions (O'Reilly, 1987). Proper and effective briefing is founded in the clear definition of the client's requirements and their communication of such to the design team. Recent

studies (Lindahl and Ryd., 2007; Yu et al., 2006) show that the briefing process still poses challenges to the construction process and this is evident in the communication and information exchange between client, architect, consultants, facility managers, and the users of the facility. Although, client and user representation is considered to be a critical success factor of the briefing process (Yu et al, 2006), little attention has been paid to the actual process of engagement from a client perspective. Improper elicitation and documentation of briefs is often one of the reasons for dissatisfaction amongst clients when the information contained in it are insufficient to produce an accurate design solution. This shortcoming can manifest itself in the ultimately poor performance of the resultant building (Bowen, 1999). According to Salisbury (2013), inadequate requirement elicitation and documentation is probably the main reason why buildings have been wasteful of resources or defective in use. This inadequate briefing culture can arise from the nature of the parties involved in the briefing process or out of the design problem itself. Briefing has become a highly complex task, needing to match the increasing complexity of client organisations and the parallel complexity of building projects (Wapukha, 2013).

Lee et al., (2005) describe the construction industry as an essentially information intensive industry where most knowledge comes from the successful completion of projects. With the increasing pressure for competitiveness on construction organisations, it is necessary to capture, transfer and reuse project knowledge and use lessons learned from previous projects to improve project performance. Given the complexity of construction-related projects and client organisations, cross-boundary knowledge transactions are of growing importance and the onus on fragmented organisations to share knowledge to deliver client solutions is necessary. The reliance on project participants to share knowledge in order to succeed in project delivery has never been greater (Rebeiro, 2009). Thus, the need for Knowledge Management (KM) in the construction industry is fuelled by the need for innovation, efficiency, improved business performance and client satisfaction. In this knowledge driven global economy, knowledge itself can be seen as a commodity that offers the only 'true sustainable competitive edge'. If knowledge is effectively managed i.e. collected, structured and disseminated, it will bring significant benefit to organisations, with potential benefits to the wider construction industry (Gould & Joyce, 2009). Through a critical review of literature, this paper will investigate the importance of knowledge capturing (KC) in the design briefing process in the construction industry. Section two will be looking at the construction process and the place of the design brief in the constriction process. Section three will be analysing what the design brief is, what a brief is and what requirement elicitation is about. Section four will be addressing the importance of KC in design briefing in the construction process, drivers for the design briefing process and the challenges that exist in during design briefing. Section five concludes the paper with a summary of the importance of design briefing in the construction process and future research opportunities.

2. Construction Project Process

The construction process consists of all the processes that prepare for or result in a planned construction or renovation. The concept involves many different types of processes, core processes, administrative processes and public processes. In traditional construction process, the building process is divided into stages, concept, briefing, planning, production, and management of the finished building. The

fundamental objective of creating these stages is to foster control, division of responsibility and cost management. In reality, the different phases have large overlapping areas during implementation. One of the fundamental and important tasks that are carried out at the initial stage of the construction process is the design briefing (Kamara et al, 2002). During the early phases of the building process, the briefing phase in the project conception stage extends into the design stage and construction stage; that is concept development phase/conceptualisation and even into the design and planning phase (Ryd, 2004). In general, when a construction project is initiated, a Facilities Planning and Construction project manager is assigned to the project, and a building committee is formed to oversee the project development until completion (Kamara et al, 2002). The life cycle of a project involves the following phases:
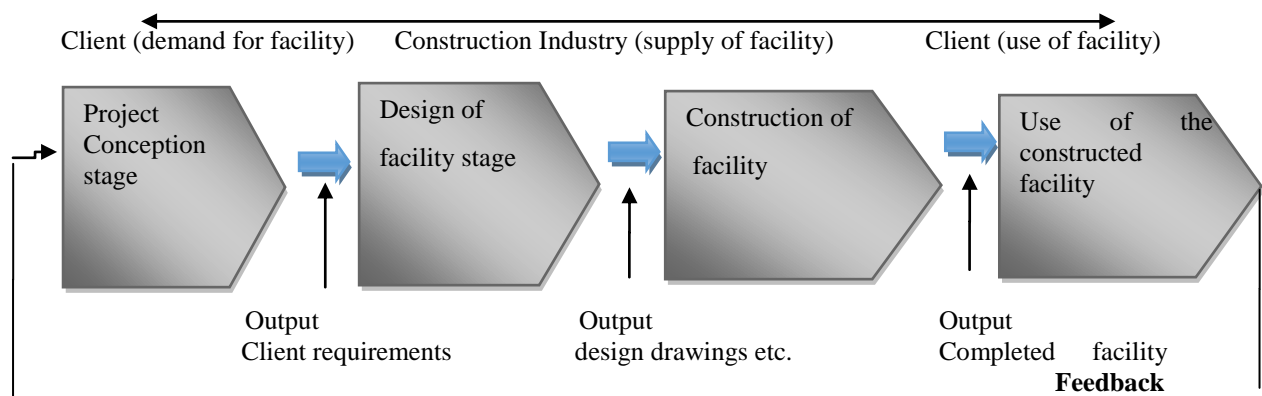
Client (demand for facility)   Construction Industry (supply of facility)   Client (use of facility)

| Project Conception stage | | Design of facility stage | | Construction of facility | | Use of the constructed facility |

Output
Client requirements

Output
design drawings etc.

Output
Completed facility

Feedback

Figure 1 Simplified model of the construction process (RIBA, 2013)

These phases are common to all new construction and renovation projects; however, in smaller projects, the phases often become less formal, involve fewer individuals and may have a short schedule of only a few months. Large projects, on the other hand, may take years from the time they are envisioned to the time "move-in" takes place. The process shown in figure 1 typifies a simplified construction process in the construction industry; however, one of the first stages in the project conception stage is the design briefing process in which the client's objectives are identified and their requirements elicited by construction professionals, which is then documented and baseline before progress is made to the detailed design stage. The next section further buttresses what the design brief is and its impact in the construction life cycle.

3. Design brief

Briefing, also known as architectural programming in the USA and Asia, is the process whereby a client's requirement is clarified and the design team is informed of their needs, aspirations and desires, formally or informally (CIB, 1997). It creates a channel to convey decisions and information between clients and consultants such that a better understanding of their requirements and preferences at the project inception stage can be achieved (Jenkins et al., 2012). Smith and Jackson (2000) further posits that briefing is the process of capturing the purpose, objectives, intended use, requirements and desired qualities of a construction project, resulting in an output document: the client's brief. Furthermore, the brief provides the design team with data to commence their design, without the preservation of their artistic

expression. Since the brief is the explicit reproduction of the client's needs, and serves as a guide and check list for the output of the various phases in the process, it has strategic value towards the end result of the project. Some other authors defined the brief which is a product of the briefing process, as a formal document containing the written instructions and requirements of a client for a building project (MacPherson et al., 1992; CIB, 1997; Blyth and Worthington, 2010; Kamara and Anumba, 2001 and Kamara et al., 2002).

Gould & Joyce, (2009) stated that at every first stage of a construction project, a brief is created. The brief is a document where the requirement of the building to be constructed is stated. Some of the properties of this document include the functions of the building, what particular spaces are needed and so on. Constructing excellence (2004) defined briefing as 'a process by which client requirements are investigated, developed, documented and communicated to the project board responsible for the construction'. These requirements need to be agreed and signed by the client before progress is made for design. Every project is preceded by a brief, though the quality can vary considerably. Good briefing is not easy to achieve, yet it has been suggested that improvements to briefing lead to clients getting better buildings Gould & Joyce, (2009). According to Salisbury (2013), the briefing process is composed of elicitation and communication of the client requirements and exists in two types, 1. Strategic brief: this is a document that communicates the overall project scope, aim and objectives; the key issues in this briefing are the success parameters, budget and programme, 2. Project (functional) brief: this is the functional statement and operational needs for the construction of the project. The development of the brief is the process of clarifying the objectives and requirements of a project.

There are two schools of thought relating to construction project briefing. One approach considers the brief as an entity in itself, which should be frozen after a critical period; hence briefing becomes a stage or stages in the design process (Yu et al., 2007; RIBA 2013). The second approach regards the brief as a live and dynamic document that develops iteratively in a series of stages from an initial global brief. Briefing is thus deemed an on-going activity that evolves during the design and construction process Yu et al., (2007). Different factors affect the way briefing is developed and carried out and these factors relate to the type of information that is required which depends on the nature of the project, size of client and the nature and skills of the design team (Morledge & Smith, 2013). Effective client briefing is now regarded as fundamental to the production of buildings which satisfy not just functional needs but also reflect user preferences in relation to the environmental qualities they create. Also, briefing has become a more involved process due to the increasing complexity of both client organisations and buildings themselves. One of the primary processes carried out during the briefing process is the elicitation of client's requirements and this process involves the use of certain knowledge capturing tools for the process to be effective.

3.1 Requirement elicitation

This is a process where professionals from the construction company meet with the clients in order to come up with the requirements. The professionals who may be involved in this process include; architects, development managers, engineers, project managers and quantity surveyors among other professionals. They used different methods of eliciting the requirements from the users such as interviews, workshops, evaluation of current facilities among others. The professionals will put together the

requirements they have collected and come up with sketches and drawings. This drawings and designs are used to clarify the needs and requirements of the clients. If the clients are well experienced in the design process, they will come up with their designs and requirements for the project. This makes the process of collecting requirements easier to the construction company (Morledge & Smith, 2013). Requirements elicitation is all about learning and understanding the needs of users and client's with the ultimate aim of documenting the requirements and communicating these requirements to the design team. A substantial part of elicitation is dedicated to uncovering, extracting, and surfacing the wants of the potential client's.

Effective elicitation of requirements is arguably among the most important and highly recommended good design briefing practices (Morledge & Smith, 2013). Requirements elicitation itself is a very complex process involving many activities, with multiple techniques available to perform these activities. The multidisciplinary nature of requirements elicitation only adds to this complexity. Elicitation is subject to a large degree of error, influenced by key factors ingrained in communication problems. Despite the importance of requirements elicitation within the design briefing process, insufficient attention has been paid to this area in industry and software engineering research to date (Zowghi and Coulin, 2007). This session has been able to create an understanding on what design briefing is, the process involved in briefing and what requirement elicitation does in the design briefing process. For all this to make better sense, the next section seek to reflect the value and importance the design brief has on the construction process and in the delivery of overall performance in the construction industry.

3.2. Importance of Design Briefing

Briefing is a process of developing a deep understanding about the client's needs and it is a continuous interaction and involvement of the client where in this process, the role of professional team is very important. Through good briefing and grasping what the real needs are, client and construction professional can work more effectively and productively on project and make decisions confidently Given that clients can potentially affect the success of the project, and the importance of briefing to the attainment of client satisfaction, it must be noted that problem areas are often associated with the nature of the client. In the briefing environment, effective communication between the client, the user of the building, the design team, the contractor, and specialist consultants, is critical (Shanmugam et al., 2006). According to Murray *et al*. (1990), it is important to note that the client can assume responsibility for initiating, directing and maintaining effective communication during the briefing process. Clients, end-users, designers and contractors do not always have the knowledge, experience, skills and attitudes to enable them to interact as a team for the resolution of problems. In essence, unsatisfactory design solutions can result from ineffective communication between the client and the design team and one of the main factor behind communication difficulties is the nature of the relationship between the communicators (clients, professionals, users and procurement team) (Wapukha, 2013).
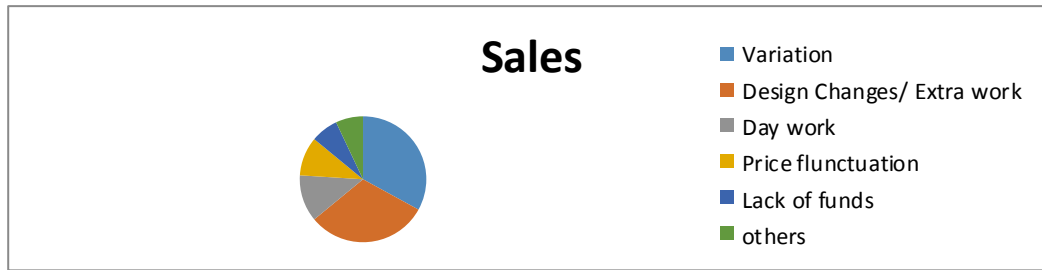
Figure 2: Breakdowns of Cost Overrun (Shanmugam et al., 2006)

Shanmugam et al., (2006) identified two basic factors that contribute to cost and time overrun, these are; Variations in construction projects and Design changes (which is as a result of changes made due to mistakes or client request). Figure 2 identifies some of the factors that are responsible for cost and time overrun and shows a percentage break down of the cost overruns. It can be seen from the above analysis that the significant cost overruns are mainly due to Variation and design changes. The sources of variations and extra work can be classified into client initiated variations and unforeseeable variations. The main reasons behind the higher percentages in variation and design changes or extra work are identified as changes during the construction stage which could arise as a result of improper management, ineffective communication and incorrect assessment of the design brief. Wapukha (2013) in his research study stated that one of the major problems confronting the global construction industry is the briefing of the client whom a project may encounter. The main reason why there is a problem with the clients, stakeholders and the design team is because not much attention is given to the needs of the clients. The process of acquiring what the client needs is very important and must be taken seriously. The impact of decisions made will affect the client because they are the end consumers of a given products. They are also going to be affected financially since clients may be the major sponsors of the project (Kelly, Male & Graham, 2008). Certain barriers do exist in the design briefing process and if these barriers can be exploited and overcome, they will be become an organizations strength and opportunity for better performance. The next session discusses the barriers that occur in the design briefing process.

3.3 Barriers to the Design Briefing process

Bowen et al., (1999) carried out a research to identify associated challenges or barriers that occur during the design briefing process, they were able to gather responses from different team members involved in the requirement elicitation process. They stated that often a lack of understanding on the part of clients about the design and construction processes could be a challenge. Clients are said to lack general experience; for example, being unfamiliar with local authority regulations and town planning issues. Clients frequently fail to provide a comprehensive listing of their project requirements. Also, clients do not fully understand their own roles within the building process, as well as legal and financial considerations. Insufficient time is devoted to the briefing process and, in some cases, briefing is prematurely initiated before alternatives have been analysed by the client. Instances of personality clashes, the vagueness of the brief, and the inexperience of the client, were cited as exacerbating factors. Other barriers to effective briefing include vagueness on the part of the client in terms of requirements, insufficient time being devoted to the briefing

process, briefing team members being under-qualified for their roles, and inadequate guidance being given by the principal agent.

Some clients appear to be inflexible and reluctant to heed advice from their professional consultants. A lack of clarity with regard to communication networks between consultants is also perceived to be a barrier to effective briefing. A perceived lack of transparency in the briefing process was cited as a barrier to communication between professional and clients. Interesting further research might be indicated by this perception. Sometimes, clients do not participate in the briefing process due to their lack of knowledge regarding what they wanted, their lack of understanding of the briefing process itself and the roles and responsibilities of the professional team members. Barriers to effective communication between participants to the briefing process also appear to exist. The implication is that these barriers to effective briefing may impact negatively on levels of client satisfaction with their buildings (Bowen et al., 1999).

All the above identified challenges that exist in the briefing process need to be addressed properly and if exploited rightly, will develop as a major strength and opportunity for the project. During the design briefing process, knowledge is exchanged amongst the parties involved in the requirement elicitation phase that is the clients and the design team. However, for this knowledge to be properly elicited and documented, certain KM techniques are used to effectively clarify client's requirement and document them properly (Jenkins et al., 2012). One of the document produced in the design briefing process is called the brief, which is developed during the briefing process. This document needs to be signed and agreed between the client and the contractor before progress is made on the project. The next section sheds more light on what knowledge management is and how KC a subset of KM can effectively impact the design briefing process.

4. Knowledge Management

Organizations are coming to terms with the fundamental reality that most of the knowledge impacted or developed by some individuals either through experience, trainings and other modes of knowledge transfer mechanisms has been lost as a result of turnovers, which has created a gap in knowledge storage and exploitation. Some of these professionals move to different organizations having ingrained themselves with tacit knowledge as a result of years of experience, and this has widened the knowledge gap and created high level shortage in knowledge storage and exploitation hence the idea of knowledge management. The management of knowledge has received increased attention and interest as it reflects that academia recognizes the fundamental economic changes resulting from the availability of knowledge and how it affects an organization's performance strategy (Carneiro, 2003). Through KM, organizations seek to acquire or create potentially useful knowledge and to make it available to those who can use it at a time and place that is appropriate for them to achieve maximum effective usage in order to positively influence organizational performance (King, 2009).

In today's knowledge economy, knowledge is increasingly being considered as an asset that needs to be effectively managed to create added wealth to an organization (Lin and Lee, 2011). However, knowledge, unlike natural resources and other physical capital, is not depleted when it is used; but instead it creates an opportunity for further growth, refinement and marketability. Within the architecture, engineering

and construction (AEC) industry, companies are beginning to realise the importance of capturing knowledge accrued on projects to improve the quality and effectiveness of future projects (Egan, 1998). In the construction environment, KM is a discipline that promotes an integrated approach to the creation and generation, capture and storing, sharing and communication, transfer and reuse of knowledge of a particular field obtained from projects experiences which has been previously undertaken. (Lin and Lee, 2011). Knowledge can be seen as a key source of advantage. Its importance has been recognized for a long time. Drucker (1995) wrote that "knowledge is the only meaningful economic resource". It follows that for organizations, individuals and society, the processes by which knowledge is created or acquired, communicated, applied and utilized must be effectively managed. Nonaka and Takeuchi (1995) identified two types of knowledge in knowledge management which are the tacit and explicit knowledge.

4.1 Tacit and Explicit Knowledge

In organizations, knowledge is often times embedded not only in documents or repositories but also in organizational routines, processes, practice and norms which brings us to the idea of tacit and explicit knowledge. Tacit knowledge, as stated by Polanyi (1966), is the fact that people tend to know more than they can usually tell. This type of knowledge resides within people and may be embedded in organizational and social processes, building cumulatively within the organization and it is however difficult to unravel and transfer between organizations. This body of knowledge further gained traction through the work of Nonaka and Takeuchi (1995) in The Knowledge-Creating Company which described tacit knowledge as a highly personal and hard to formalize knowledge which makes it difficult to communicate and share with others (Szulanski et al., 2004).

Explicit knowledge on the other hand is a type of knowledge which is codified, transferable and relieved with ease (Polanyi, 1958). This medium for communicating such knowledge includes documents, repositories, graphs, diagrams just to mention a few (Bhagat, et al., 2002). In transferring knowledge across organizational boundaries, organizations must solve 'the boundary paradox' - their borders must be open to flows of information and knowledge from the networks and markets in which they operate (markets which increasingly blur traditional boundaries), on both formal and informal bases, whilst at the same time the organization must protect and nurture its own knowledge base and intellectual capital. It is upon the dynamic preservation of the latter that survival depends. During the requirement elicitation process in design briefing, certain knowledge exists in the elicitation process and these knowledge needs to be captured effectively for better performance. The next sub topic discusses KM in design briefing.

4.2 Knowledge Capture in Design Briefing

KM during the briefing process follows the established generic system (Ibrahim et al., 2006), summarised in six processes (Turban et al., 2011) i.e. capture knowledge, refine knowledge, store knowledge, manage knowledge, disseminate knowledge and create knowledge as depicted in the figure 3 below:
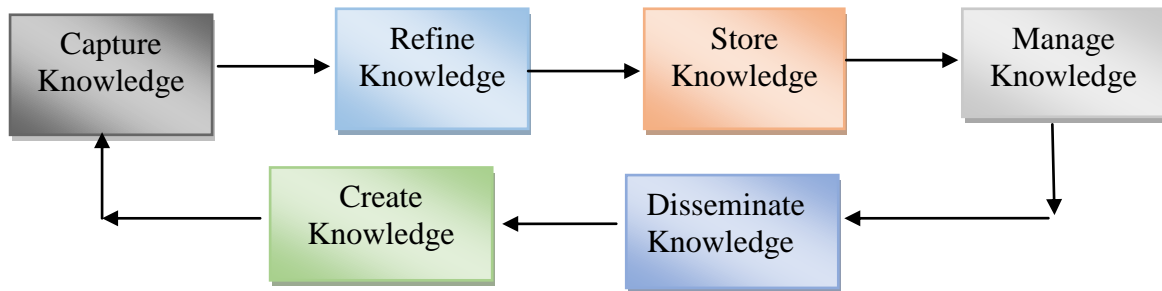
Figure 3. Cyclic Model of Knowledge Management System (adapted from Turban, 2001)

For the purpose of this paper, emphasis will be placed on the importance of knowledge capturing and elicitation in the design briefing process coupled with the fact that it instigates every requirement elicitation process in design briefing.

Hari et al (2005) defined knowledge capture as a process through which knowledge is recognised from its source, examined and in accordance with the organisation's strategy. Appropriate techniques and technologies are implemented to retain the knowledge, which is filtered, banked, disseminated and updated. Powers (2005) suggests that one of the first steps in capturing knowledge is to identify the critical knowledge that might be at risk in the organisation as a result of downsizing or retirements. Collison and Parcell (2001) put forth their views that knowledge capture means capturing know-how in such a way that it can be reused. There needs to be a link between capturing knowledge before, during and after an event, project or task has been executed; and in terms of accessing what has already been captured. Train et al., (2006) reports focus on efficiency and effectiveness to drag the construction industry out of its perceived low productivity growth. Interestingly, these reports acknowledge the need for construction industry to better manage knowledge that resides in the supply chain, with the clients and internally within construction firms.

Clients are becoming more sophisticated, insisting on better value for money, and demanding more units of construction for fewer units of expenditure (Egan, 1998). The demanded products are also becoming more complex, with increasing emphasis on environmentally friendly facilities. The fragmented nature in which the industry is organized means that efficiency in project delivery is less than expected, resulting in dissatisfied clients, and low profitability for construction firms (Hari et al., 2005; Carrillo *et al.*, 2004). In addition to the many initiatives that are being introduced to address these issues, the effective management of project knowledge is now seen as vital in enhancing project performance in construction projects. Becerra-Fernandez et al., (2004) defined knowledge capturing as the combination of knowledge elicitation and knowledge representation. During the design briefing process, knowledge elicitation is carried out by capturing client's requirements which is useful and important information from the users and this process represents the starting base of a good design brief. Certain knowledge do exists during the design briefing process and these knowledge must be adequately captured, elicited and properly documented for informed decision making for better performance. For the purpose of this paper, the researcher will focus on the impact of knowledge elicitation in the knowledge capturing process. The operational definition of Knowledge capturing for the purpose of this paper involves the process of eliciting and documenting the clients/users

requirements during the design briefing process for the purpose of improve performance within construction projects.

4.3 Barriers to Knowledge Capture

Collison and Parcell (2001) suggest that knowledge capture means capturing knowhow in such a way that it can be reused. There needs to be a link between capturing knowledge before, during and after the event/project/task has been executed; and in terms of accessing what has already been captured. A few challenges have been identified through a thorough review of literature from the social and technology perspective for knowledge capture. Some organizations feel that the knowledge capture Return on Investment (ROI) figures do not generally add up, so knowledge capture initiatives are relegated to the level of a "luxury item", and therefore something to be considered in the future (Lee et al., 2005). This has made other organization adopt the "wait and see" approach with regards to the uptake of knowledge capture initiative. This approach has created a gap and a continued loss in vital knowledge capital and competitive advantage daily (Lee et al., 2005).

Some of the other barriers that occur in knowledge capturing is lack of capturing clients and (or) supply chain knowledge in an effective formal way. Most knowledge capturing processes are not given the adequate attention and formality required to make the process efficient (Achammer, 2009). Another barrier identified is the type of organisational culture encouraged for knowledge capture. If an organization does not create a suitable culture that supports knowledge capturing, this could demean the potency and power of knowledge capturing in an organization. Another identified barrier that occurs is that most knowledge capturing process does not consider wealth of techniques available to adequately capturing knowledge. During requirement elicitation in design briefing, several knowledge capturing techniques need to be identified and used in order to ascertain the effectiveness of such techniques. Lack of process for knowledge capture is another essential protocol that needs to be addressed as many KC process does not take into consideration the process involved in knowledge capturing. This should include a pre-process and a post process review process and should be adequately documented for reuse in the future. The benefits of proper KC should also be identified and spelt out to encourage the organization see the importance of properly capturing knowledge. Another challenge identified is the lack of time allocated to knowledge capturing process. The more time allocated to the knowledge capturing process, the more quality document would be produced from the process. This can be made possible by the support of management; however, lack of management support can also contribute to less effective knowledge capturing process (William and Walter 2014). Barriers to knowledge capturing in the construction industry shows that this could be a major deterrent to the progress of construction projects and delivery of quality output. The next section investigates the importance of knowledge capturing in the construction industry.

4.4 Importance of Knowledge Capture in design briefing

KC initiatives provide opportunities for organisations to innovate, improve project methodologies, cut costs, save design time and reduce time to market. Knowledge is a complex concept which consists of information and skills acquired through experience. Knowledge represents itself in truth and belief, perspective and judgments, expectations and methodologies and exists in individuals, groups and in organisations, in various forms. Capturing client's requirements using KC techniques during design briefing is vital for the competitiveness of an organisation as well as

performance. The type of decisions made is based on the quality of information elicited from clients during the design briefing process (Hari et al., 2005). The Information Technology Construction Best Practice (ITCBP, 2004) suggests that discussions about knowledge management usually refer to the need to capture one or both of the different types of knowledge which are the explicit and tacit knowledge. Explicit knowledge is the very factual information that is relatively easily to document, i.e. a list of experts; telephone numbers, and details of previous contracts for a particular client; methods of repairing a common fault, and so on. Tacit knowledge is much harder to address. It refers to the more subjective approaches people take in situations where there may be no single right or wrong answer. Tacit knowledge is seen as one of the keys to why a particular organisation is successful.

Knowledge capturing in the design briefing process involves use of both tacit and explicit knowledge. One of the key benefits of knowledge capturing in the design briefing process is the ability to elicit requirements from clients which is knowledge embedded in the mind of the clients in relation to the anticipated building they have in mind and these requirements needs to be properly documented (explicit) in such a manner that the design team can produce quality designs. It has been identified that one of the major reason behind defective designs can be traced to inadequate time given to the briefing process and this can account for the high level of increased cost and delay in project delivery. Quintas (2004) suggests that knowledge capture could lead to better problem solving and higher client satisfaction and improvement in the design briefing process in the pre-design stage of construction projects. As a result, giving adequate time to the design briefing process can reduce the level of design mistake that occur in the construction process and also improve the quality of output produced at the end of the project. However, no matter the amount of time given to the design briefing process without the right knowledge capturing tools and techniques, it could most likely lead to a frustrating activity which could impact on the overall objective of the briefing process. This goes to highlight the importance of knowledge capturing in the design briefing process and shows that no matter the quality of knowledgeable professionals and client present at a briefing meeting, the knowledge management strategy used to address the process has a major significance on the productivity of the process.

According to Achammer (2009), the costs of briefing cost about 1.5% of the total life cycle costs of the project. However, this relatively small amount immensely influences the performance of the overall costs, which can rise up to more than 80% of the total life cycle cost. When a project commences, the costs for changes are still minimal, but as the project progresses, there is an increase with the cost of changes that occur to the project. This is why it is very essential to capture the necessary knowledge available at the early phase of the project by properly eliciting requirements and documenting them properly. One of the underlying challenges discovered is the lacking willingness of today's clients and professionals to invest into the pre-design phase and this can be addressed by proper and adequate insistent communication between clients and professionals.

The intention of every client is to build an excellent and unique building. However, the definition of excellence is subjective and varies within the different decision makers and the planners transforming the wishes into the build reality. "There can´t be an excellent building without knowing what´s excellent". The design briefing process uses several knowledge capturing methods to make these different pictures transparent and decreases the variety of diverse imaginations. The design briefing

process provides the basic discussion and supports the development of clearly defined goals. Gould & Joyce, (2009) stressed the importance of involving the user (client) in the writing of the program because they have unique and specific requirements for that particular project. Client's understanding may vary when it comes to building processes, as a result, those owners who seldom occupy themselves with building projects often need guidance and assistance from the professionals hired to produce the design brief (program) and the design. In such cases, the professional may need to take more initiative in involving the owner in the design briefing process. Conversely, owners that are more familiar with the building process do not need as much assistance since they are already familiar with other building projects. This does not, however, rule out the importance of design brief and effective requirement elicitation process. Once the decisions have been made in the pre-design stage, they cannot be easily changed in other stages. This means that early stages are very critical to the success of the project and it is vital that decisions are made cautiously. This is a stage that requires all the stakeholders' involvement, clients and expertise of the design team (Wapukha, 2013). The pre-design stage is the most critical phase in the construction decision making process, however, if the knowledge that exists between the professionals and the clients is not properly elicited and documented accurately, it may lead to deficiency in performance output and this can also lead to dissatisfied clients and a bad reputation for the organization.

5. Conclusion

The brief is the decisive interactive element in which the client's needs and requirements are translated and incorporated into the building process. If this process can take place in a way that strengthens and develops relationships in a positive way, there is every chance that the brief will also improve and strengthen the client's business activity. Today more and more professionals consider briefing to be an important factor for project success. Thus, it is important for practitioners to have a better understanding of the critical success factors for briefing and the interactions between them. Improper design briefing is a challenge to most of the construction projects. Without a proper communication strategy between clients, stakeholders and design team, the project output might experience failure and under performance. It is necessary and essential to ensure adequate design briefing at the conception stage of every construction process. The clarity of client's requirement and the proper documentation of the requirements in the design briefing process would most likely help construction projects improve performance delivery. This goes on to say that more attention should be given to the design briefing process in the construction process because of its importance in improved performance delivery. Capturing knowledge that exists in the design briefing process through elicitation helps in problem solving, managing change, increased performance, satisfied clients, higher bidding power, to name a few. The effective implementation of knowledge capturing could reduce costly mistakes and ensure improved services to clients. Knowledge capture enables organisational growth as a result of number of successful projects completed. Knowledge capture is not about a one-off investment. It is an investment that requires consistent attention over a substantial period of time, even after it begins to deliver results. More research effort needs to be targeted at improving knowledge capturing in the design briefing process and identifying effective knowledge capturing tools and techniques that are more efficient in the requirement elicitation process in the construction industry.

REFERENCE

Amlus Ibrahim, Hirun Azaman Ismail, Susita Hj. Asree, Mohd Radzai Said (2006); "Knowledge Management as Strategy for K-Economy: Looking At Malaysia Environment." Universiti Utara Malaysia. Unpublished.

Becerra-Fernandez, I., Gonzalez, A. & Sabherwal, R. (2004); "Knowledge management Chllenges, Solutions, and Technologies". New Jersey: Pearson Education, Inc

Bhagat, R.S., Kedia, B.L., Harveston, P.D. and Triandis, H. (2002); "Cultural variations in the cross-broader transfer of organizational knowledge: an integrative framework", Academy of Management Review, Vol. 27(2), pp. 204-21.

Blyth A and Worthington J. (2001); Managing the brief for better design. London and New York: Spoon Press.

Bowen, P.A., Pearl, R.G., Nkado, R.N. and Edwards, P.J. (1997); "The effectiveness of the briefing process in the attainment of client objectives for construction projects in South Africa COBRA '97": RICS Research, Royal Institution of Chartered Surveyors, UK, pp. 1–10.

Carneiro, A. (2000); "How does knowledge management influence innovation and competitiveness"? Journal of Knowledge Management, Vol.4 (2). pp 87-93.

Carrillo, P., Robinson, H., Al-Ghassani, A. and Anumba, C. (2004) "Knowledge Management in UK Constructions: Strategies, Resources and Barriers". Project Management Journal, Sylva: Apr 2004, Vol.35 (1), p.46.

Collison, C. and G. Parcell (2001); "Learning to fly: Practical lessons from one of the world's leading knowledge companies". Capstone, Oxford.

Construction Research Communications (2000); "Better briefing: capturing user requirements for buildings a clients' project definition tool". UK: The University of Reading.

Construction Industry Board (1997); Briefing the Team. London: Thomas Telford Publishing

Coulin, C., Zowghi, D. (2004); "Requirements Elicitation for Complex Systems: Theory and Practice, in Requirements Engineering for Socio-Technical Systems", edited by Jose Luis Mate and Andres Silva, Idea Group: USA.

Cynthia ChinTian Lee, Charles Egbu , David Boyd , Hong Xiao , Ezekiel Chinyo (2005); "Knowledge Management for Small Medium Enterprise: Capturing and Communicating Learning and Experiences CIB W99 Working Commission 4th Triennial International Conference Rethinking and Revitalizing Construction Safety, Health, Environment and Quality, Port Elizabeth – South Africa, 17-20 May 2005, 808-20

Dennis Wapukha (2013); Decision to build and client briefing issues and procurement out with UK.

Egan, J. (1998); "Rethinking Construction. Report of the Construction Task Force on the Scope for Improving the Quality and Efficiency of UK Construction", Department of the Environment, Transport and the Regions, London.

Eriksson, P. E., & Westerberg, M. (2011); "Effects of cooperative procurement procedures on construction project performance: a conceptual framework". International Journal of Project Management, 29(2), 197-208.

Francisco Loforte Ribeiro, (2009); "Enhancing knowledge management in construction firms", Construction Innovation, "Construction Project Management". Third Edition. New Jersey, USA: Pearson, Prentice Hall. Vol. 9(3), pp.268

Green, S.D. (1994); "A metaphorical analysis of client organisation and the briefing process". Construction Management and Economics, Vol.14, No.2, pp.155-164.

Hari, S, Egbu, C and Kumar, B (2005); A knowledge capture awareness tool: an empirical study on small and medium enterprises in the construction industry. Engineering, Construction and Architectural Management, 12(6), 533-567.

Hershberger, R. (1999); 'Architectural programming and pre-design manager'. McGraw–Hill, New York.

Jenks, M. (1988); "The Briefing Process; A Critical Examination". Chartered Institute of Building, King's Ride, Ascot.

John Kelly, Steven Male and Drummond Graham (2008); "Value Management of Construction Projects". John Wiley & Sons.

Kamara JM, Anumba CJ, Evbuomwan NFO (2002); 'Capturing client requirements in construction projects'. London: Thomas Telford.

Kamara JM, Anumba CJ (2001); 'A critical appraisal of the briefing process in construction'. Journal of Construction Research. Vol 2(1):13–24.

King, W.R. (2009); "Knowledge Management and Organization Learning: Annals of Information System, 4th edition". Springer Dordrecht Heidelberg London New York, Springer Science Business Media, LLC 2009, pp. 3-11

Land, F. (2009); "Knowledge Management or the Management of Knowledge"? Knowledge Management and Organization Learning: Annals of Information System, 4th edition.

Latham, Sir M. (1994); 'Constructing the Team'. Her Majesty's Stationery Office, London.

Li-Wei Wu, Jwu-Rong Lin, (2013); "Knowledge sharing and knowledge effectiveness: learning orientation and co-production in the contingency model of

tacit knowledge", Journal of Business & Industrial Marketing, Vol. 28(8), pp.672 – 686

Lin, L.M. and Hsia, T.L. (2011); "Core capabilities for practitioners in achieving e-business innovation", Computers in Human Behavior, Vol. 27(5), pp. 1884-1891.

Love, P. E. (2002); 'Influence of project type and procurement method on rework costs in building construction projects'. Journal of Construction Engineering and Management, 128(1), 18-29.

Luck, R, Haenlein, H, Bright, K (2001); Project briefing for accessible design Design Studies Vol 22 No 3 pp 297-315

Morledge, R., & Smith, A. (2013); "Building procurement". John Wiley & Sons.

Nonaka, I. and H. Takeuchi (1995); "The Knowledge Creating Company", Oxford, Oxford University Press.

O'Reilly, J.J.N. (1987); "Better Briefing Means Better Building. Building Research Establishment", Garston, Watford.

P.A. Bowen, R.G. Pearl, P.J. Edwards, (1999); "Client briefing processes and procurement method selection: a South African study", Engineering, Construction and Architectural Management, Vol. 6 Iss: 2, pp.91 – 104

Paul Jenkins, Iain Scott and Andy Challen (2012); "Client Briefing: Eliciting Design Preferences from Building Users with Communication Impairments".

Polanyi, M. (1958); Personal Knowledge: "Towards a Post-Critical Philosophy. University of Chicago Press, Chicago

Power D, (2005); "Supply Chain Management integration and implementation, a literature review", supply chain management: An International Journal. Vol. 10 (4). pp 252-263

RIBA (2013); The Architect's Plan of Work. London: Royal Institute of British Architects.

Richard Fellows, Anita Liu, Colin Storey (2004); "Ethics in construction project briefing; Science and Engineering Ethics". Vol 10(2) pp 289-301

Ryd, N. (2004); "The design brief as carrier of client information during the construction process". Design Studies, Vol. 25, pp. 231-49.

Salisbury, F. (2013); Briefing your architect. Routledge.

Shanmugam, M., Amaratunga, R.D.G. and Haigh, R.P., (2006); Women in Construction: A study on the Leadership. 6th International Postgraduate Research

Conference in the Built and Human Environment, 6th – 7th April, Delft University of Technology and TNO, Delft University, Netherlands

Szulanski, G., Cappetta, R. and Jensen, R. (2004); "When and how trustworthiness matters: knowledge transfer and the moderating effect of casual ambiguity". Organization Science, Vol.15 (5), pp. 600-613.

Tavistock, (1966); The Tavistock Institute Interdependence and Uncertainty.

Train, A, Egbu, C O and Hicks, J (2006); "Key issues in innovation and knowledge management in the finance and construction sectors". In: Boyd, D (Ed) Procs 22nd Annual ARCOM Conference, 4-6 September 2006, Birmingham, UK, Association of Researchers in Construction Management, 1003- 1013.

Turban, E., Sharda, R. and Delen, D. (2011); "Decision Support and Business Intelligence Systems". Boston, Prentice Hall.

Turban, D. B. (2001); "Organizational attractiveness as an employer on college campuses: An examination of the applicant population". Journal of Vocational Behaviour, Vol 58 pp 293–312.

UKCG (2009); Construction in the UK Economy; the Benefits of Investment.

William G. Dzekashu and Walter R. McCollum (2007); "A Quality Approach to Tacit Knowledge Capture: Effective Practice to Achieving Operational Excellence" International Journal of Applied Management and Technology, Vol. 13(1), Pages 52–63.Walden University, LLC, Minneapolis, MN

Yu T.W Ann; Qiping Shen; John Kelly; and Kirsty Hunter (2006); "Investigation of Critical Success Factors in Construction Project Briefing by Way of Content Analysis". Journal of Construction Engineering and Management, Vol. 132, No. 11, November 1, 2006.

Yu, A. T. W., Shen, Q. P., Kelly, J., and Hunter, K. (2007); "Application of value management in project briefing." Facilities, Vol.23 (7/8), pp. 330–342.