Influence of Client Understanding on Quality of Design

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Abstract

Clients understanding are crucial to the success of a project. This is because their understanding influences the cost and time aspects of the project and relative to maintaining these within stipulated schedule. The aim of the study is to assess clients level of understanding and quality of design relative to project delivery. The study was conducted in Lagos, Nigeria. Respondents for the study are architects, builders, quantity surveyors, and engineers. Random sampling technique was employed in the selection of samples. A total of one hundred and twenty questionnaires were analysed for the study, Descriptive statistics was employed for the analysis.

Findings include that ability to effectively brief the design team, ability to contribute ideas to the design process, stability of decisions, conflicting design information, and missing information top as factors that determines the quality of design. Recommendations include attention should be given to Adequate briefing, the evaluation of contractors' technical and financial performance, will result in a better understanding of the contractors' overall capabilities, and Design quality assurance / constructability reviews.

Keywords: Client, construction, design, quality, understanding.

Introduction

The understanding of clients regarding the processes of construction is very important to prompt delivery of projects. The decisions of client at different stages of the project may exert positive or negative influence on the project. Positive influence are such that afford the project to be completed as stated within the initial estimated time, cost and quality, while negative influences are such, that will pull these parameters beyond what are their initial plan. Clients are expected to make contribution to the design team at the design stage and the construction team at the construction stage. The quality of his designs affects the parameters as stated above. These could result in cost and time overruns, rework, dissatisfaction among the design, construction team and the client, and result in ultimate abandonment of the project. Therefore, this study aim to identify the factors that affects project delivery with regards to client understanding of the design and construction processes.

Literature Review

The literature review to this paper will be discussed in two pats. The first part will discuss the contributing factors relative to clients' understanding of the design,

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procurement and construction processes, while the second part will discuss contributing factors of client to the design team.

Clients' Understanding of the Design, Procurement and Construction Processes

This section discusses the various factors relating to clients which contribute either positively or negatively to project delivery time.

Understanding of the Project Constraints

Pheng and Chuan (2005) rate the type of client as the third factor of the fourteen found to negatively affect project performance. Clients' understanding of the project constraints afford appreciation of the challenges encountered by the main contractor to a project. Koushki *et al*. (2005) identify the client's lack of experience as a major contributor to time delay. Leung *et al.* (2004) report that clients' construction experience has a high loading (0.810) regarding testing relationship between management mechanisms and the satisfaction variables for construction projects. Constraints are circumstances / situations outside the immediate control of parties to a contract that affect the smooth flow of activities. These could be in the form of finance which may marginalise H & S, transportation, material, labour and machines. In terms of design it may be the client's ability to adequately brief the design team on what he / she intends to build. Contrary to this view, Chinyo & Akintoye (2008) cite Lerbinger (2006) who contends that organisations that engage with their stakeholders actively are more likely to succeed.

Ability to Effectively Brief the Design Team

Belout and Gauvreau (2003) point out that it is important to define and communicate the project mission clearly during the planning stage. Further, it is also essential at this stage to fully grasp clients' needs and establish with them the project's limits and priorities - expected quality standards; schedules risk acceptance; method of project management to be adopted; monitoring actors, and so on. The ability of the client to effectively brief the design team could avoid revision of drawing and reworks. The Construction Industry Review Committee (2001) recommends that clients set out requirements of their projects clearly, systematically and comprehensively. Further, Chan *et al.* (2004) identify clients' ability to brief as one of the human-related factors that affect the success of a construction project. The accuracy of the briefing of the design team regarding the intention / purpose of buildings is directly proportional to the level of representation of the intention / purpose in the design. If intentions are not appropriately conveyed, it will affect the design and it implies that whatever is represented in the drawing is that which the contractor will build. Yu *et al.* (2006) highlight the problems associated with briefing as a lack of a comprehensive framework; lack of identification of client requirements; inadequate involvement of all the relevant parties of a project; inadequate communication between those involved in briefing and insufficient time allocated for the briefing. These are potential factors that could cause significant delays on project delivery. Mbachu and Nkado (2004) note that there is a need to grasp the needs of a client and provide satisfactory service in order to avoid undesirable consequences such as negative word-of-mouth, complaints, redress seeking, reduction of market share and profitability levels, and possible divestment from the industry. Cheug *et al.* (2000) declare that the extent to which a project is dispute-free from the client determines the measure of success of the project. Therefore the needs and expectation of clients should be known and met.

Ability to Contribute Ideas to the Design Process

Phua (2005) concludes that good communication by clients with project team members is viewed as important to project performance. The ability of the client to contribute ideas to the design process may result in a design with no or limited errors. In the instance that the client does not have an understanding of the design process, the designer is left alone to work on the brief given to him by the client, which may not be comprehensive for a faultless design. Chan *et al.* (2004) assert that clients' ability to contribute to design affects the construction of projects.

Ability to Quickly Make Authoritative Decisions

Faridi and El-Sayegh (2006) and Dulaimi *et al.* (2005) identify slowness of the owner's decision-making process as the third most influential factor out of forty-four factors causing delays in construction projects. Blisman *et al.* (2004) highlight the fact that client indecisiveness and non–uniformity negatively affect project delivery, which rank among the ten most influential factors within construction clients' multi–project environment. Chan *et al.* (2004) say that clients' ability to make decisions affects construction projects. The extent to which the client can make authoritative decisions helps in avoiding delays in the delivery of projects. Clients that need to consult other associates with respect to making decisions may affect prompt delivery of projects. When this type of situation is encountered decisions that may affect the project negatively could be taken.

Stability of Decisions

Stability of decisions is very crucial in the construction process. The changing of decisions may lead to changing of designs, plans, rework, and material loss, among others. Baldwin *et al.* (2004) contend that clients' indecisiveness is the second significant factor that influences project delivery in their findings. Furthermore, Abdel-Wahab *et al.* (2008) declare that changes made by clients contribute to the delay of projects. Citing Olomolaiye (1996), Koushki *et al.* (2005) add that change-orders as a result of changing selections contribute to delays.

Ability to Contribute Ideas to the Construction Process

Phua (2004) concludes that the factor that has the most influence on multi-firm project success is communication between project firms and clients. Through the implementation stage, the communication needs change from provision of data by the owner, to review, and acceptance of plans and deliverables, together with early warnings if the owner cannot fulfil his / her obligations stated in the project plan. Communication can occur in order to transfer an idea or contribute to decision-making. Phua (2005) asserts further that good communication with project team members is viewed as important to project performance at all levels. Chan *et al.* (2004) say that, clients' ability to contribute to the construction process affects the success of the project. The ability to contribute ideas in terms of changes required during construction as a result of changing taste to suit desire can impact either positively or negatively on the construction speed. Clients that embark on construction activities once in fifteen or twenty years may not have valuable ideas to contribute to the construction process and may affect delivery time negatively. Clients that embark on construction activities every other year may have valuable ideas to contribute to the construction process thereby affecting construction speed positively. Mathur *et al.* (2008) argue that the engagement of stakeholders within a project could link with the project decision-making process in order to explicitly affect key decisions.

Quality of Management during Design

Hsieh *et al*. (2004) determined that problems with design and planning are the major cause of change orders which lead to delays in the delivery of projects. Poor drawings were considered to be another cause for low productivity. Design management is a tool which managers use to increase project performance. It is a process that includes open forum presentations, a style that allows discussion of issues by all project team members and has the capacity to ensure a faultless design. Santoso *et al.* (2003) assessed risks in high-rise building construction in Jakarta and found that risks related to design and management are the most significant factors which affect construction performance.

Conflicting Design Information

Acharya *et al.* (2006) determined that ambiguous specifications are one of the six critical construction conflicting factors in the Korean context that affect project delivery time negatively. This refers to an item having double representation either in numerical value or in statement. For clarity and smooth flow of work, designs should be checked more than once before they reach the contractor. It is also advised that designs should be checked by the contractor for clarity and to avoid ambiguity upon receiving the award. If these exercises are not conducted, it may lead to delays. Oyedele and Tham (2006) conclude that architects should improve on design quality so as to satisfy their clients' requirements and ensure successful project delivery as a whole.

Timeliness of Issuing of Revised Drawings

According to Yakubu and Sun (2009), design change(s) is the most influential factor inhibiting the delivery of projects on time in the United Kingdom construction industry from the perspective of the contractor and the consultants. Walker and Shen (2002) declare that a delay in design documentation was ranked the second most influencing factor that negatively affects project delivery. Time should not be wasted in the process of issuing revised drawings. The joint contract tribunal (JCT) specifies that revision of drawings should not take more than three days after which the contractor can claim for extension of time. This could increase the final project cost to the disadvantage of the client, which the client might not want to incur. Revisions of designs should be done promptly.

Missing Information

Andi and Minato (2003) say that poor design and documentation quality negatively affect the construction process. Alaghbari *et al.* (2007) identify incomplete documents as one of the top ten factors causing delay in the delivery of projects in the Malaysian construction industry. Missing information interrupts the smooth flow of work. Contractors are employed to build in such a way that they adhere to design and specification. Assumptions should not be made while constructing, therefore missing information should be brought to the notice of the designer and a quick response should be given to address this.

Dimensional Inaccuracies

Walker and Shen (200) say that mistakes in design form part of the contractor-related factors which were ranked second in contributing to delays in the delivery of projects. Acharya *et al.* (2006) determined that design errors are one of the six critical construction conflicting factors in the Korean context. Dimensional inaccuracies are to be brought to the notice of designers and these should be resolved promptly, to avoid delays in the delivery of project. JBCC clause 17.1.2 bestows the responsibility on the principal agent to issue the contractor instructions with regards to the rectification of

discrepancies, errors in description or omission in contract documents other than this document.

Expediting Shop Drawings

Out of forty-four causes of delays identified by Faridi and El-sayegh (2006) in the United Arab Emirates, preparation and approval of drawings is the most influential. Delay in the release of shop drawings could affect speedy completion of work sections. Shop drawings should be delivered to the contractor whenever the need arises with no delays. Clause 32.5.1 of the JBCC states that the failure to issue or the late issue of a contract instruction following a request from the contractor entitles the contractor to claim for the expense in loss incurred, having notified the principal agent within forty working days from becoming aware or from when he / she ought reasonably to have become aware of such expense and loss.

Methodology

The focus of the study was to identify and assess influencing factors of client understanding of the construction and procurement processes on the design team. The study was conducted in Port Elizabeth in South Africa. The sampling frame consisted of architects (9), master builders (18), quantity surveyors (23), and structural engineers (23), clients (12) and others (3). The formula used for the calculation of sample size is given as:

- S = X2NP(1-P) / d2(N-1) + X2P(1-P);
- S = The required sample size;
- X2 = The table value of chi-square for 1 degree of freedom at the confidence level of 3.841;
- N = The population size;
- P = Population proportion assumed to be .50 which provides the maximum sample size, and
- D = The degree of accuracy expressed. In this case, 0.05 was used Krejcie and Morgan (1970).

Probability sampling technique was employed for sample selection. For the Architects Master Builders, and the Clients random sampling was used. Systematic sampling techniques was used for the quantity surveyors, and for the structural engineers and other the entire sample were surveyed based on the recommendation of Leedy *et al.* (2005) that researchers should endeavour to maximise the sample size and provide the following guidelines for selecting a sample size:

- For small populations with fewer than 100 people or other units, there is little point in sampling, survey the entire population;
- If the population size is around 500, 50% of the population should be sampled;
- If the population size is around 1 500, 20% should be sampled, and
- Beyond a certain point (at about 5 000 units or more), the population size is almost irrelevant and a sample size of 400 should be adequate.

The research instrument for this study was a questionnaire survey, which was administered to respondents through post (Architects, MB, Structural engineers, and others) and e-mail (Quantity Surveyors). These were received through the same means.

A total of eighty-eight (88) questionnaires representing 6.1% response rate achievement recorded on questionnaire administration. Differential statistics statistical tool was used for data analysis.

The majority of respondents belong to the private sector and constitute (74%) of the total sample. The mean for the number of years an organisation has been in existence is twenty-five of the organisations surveyed. Respondents that are over the age of thirty predominate in the sample investigated. Regarding the qualification of respondents, 25% have bachelors' degrees, and they predominate in the sample. Following closely are respondents with honours' degrees, totalling 23%. Respondents with the B. Tech qualification rank next to those who have an honours degree in the form of 17%. A fraction constituting 5% does not have relevant qualifications in the industry they are employed in. With respect to the category of respondents' qualification, quantity surveyors (31%) predominate among the respondents. They are followed by engineers (27%), architects (11%), and builders (11%). The lowest response is relative to construction managers (5%). On the status of respondents in organisation, managing directors / managing members / principals (35%) predominate among respondents. Following closely is senior staff (20%), and next is managers (17%). The lowest response is relative to trainer / internship staff (1%). The mean number of respondents' years of experience is 17 and the following indicates the type of facilities respondents are involved in, the predominating type of facility that respondents have been involved in is institutional facilities (19%). Following closely is the development of residential facilities (18%); commercial offices and industrial facilities (14% each), and institutional health facilities (10%). Based on the above information the data obtained can be deemed reliable.

Data Presentation and Analysis

This section presents the data obtained of the study and the analysis.

Clients' Influence

Table 1. The Influence of Client Understanding of the Design, Procurement and Construction Processes on Project Delivery Time

Factor	Response (%)							Mean score	Rank
	Unsure	DN	Minor.....Major						
			1	2	3	4	5		
Ability to effectively brief the design team	0.0	2.4	5.9	18.8	27.1	23.5	22.1	3.31	1
Ability to contribute ideas to the design process	3.6	2.4	6.0	16.9	33.7	15.7	21.7	3.21	2
Understanding the project's constraints	1.3	3.5	10.6	16.5	25.9	22.4	20.0	3.14	3
Stability of decisions	2.3	2.3	9.3	23.3	24.4	17.4	20.9	3.09	4
Ability to quickly make authoritative decisions	1.2	3.5	12.9	21.2	20.0	20.0	21.2	3.04	5
Ability to contribute ideas to the construction process	3.6	4.8	11.9	20.2	23.8	16.7	19.1	2.95	6

Table 1 presents the respondents' rating of the influence of client understanding of the design, procurement, and construction processes in terms of various factors on project delivery time. It is notable that all factors in the category have MSs > 2.60 ≤ 3.40, which indicates that the factors have between a near minor to moderate / moderate influence on project delivery time.

The factor with the most significant influence is the ability to effectively brief the design team. When intentions are not adequately expressed, it may lead to a revision of the design. The impact of lack of adequate briefing and revision of drawings regarding construction may be the demolition of a section of a building, and reconstructing the building. In addition, it may cause work stoppages before the completion of design revisions. All of these may lead to a substantial waste of time, which may culminate in project delay.

Following this factor is the ability to contribute ideas to the design team. All requirements of the client should be communicated to the design team prior to the awarding of the contract. The inadequacies emanating from the design stage due to poor client brief definitions invariably leads to rework and other problems during construction. Therefore, experienced poor definitions of clients brief on most projects may be due to the level of client understandings relative to the construction process and design related specific intents of a facility.

The least significant factor is the ability to contribute ideas to the construction team. The business of construction, its constraints and methodology are the problem of the contractor. It is not compulsory for the client to be knowledgeable in construction or else there would be no need for contracting, particularly construction work. These may be the reasons why the factor is the least influential.

Quality of Management during Design

Table 2. The Influence of Quality of Management during Design Factors on Project Delivery Time

Factor	**Response (%)**							**Mean score**	**Rank**
	Unsure	**DN**	**Minor.....Major**						
			1	**2**	**3**	**4**	**5**		
Conflicting design information	2.3	1.2	13.8	9.2	23.0	24.0	26.4	3.36	1
Missing information	1.2	2.3	11.6	15.1	25.6	20.9	23.3	3.22	2
Timeliness of revised drawings	8.1	1.2	14.0	12.8	23.3	21.0	19.8	3.17	3
Expediting shop drawings	5.8	4.7	14.0	18.6	18.6	29.1	9.3	2.84	4
Dimensional inaccuracies	2.3	3.5	20.9	12.8	32.6	11.3	16.3	2.78	5

Table 2 presents the respondents rating regarding the influence of quality of management during design, on project delivery time. All factors in this category have MSs > 2.60 ≤ 3.40, which indicates that these factors have between a near minor to moderate / moderate influence on the project delivery time.

The factor that has the most significant influence in the category of quality of management during design is conflicting design information stemming from client input. The probable reason for this is the process it will take to correct a mistake. It may require checking the design from the beginning, which may take longer than expected. The second most significant factor is missing information. This factor may lead to delays as a result of carelessness or incompetence in design. This factor could be a result of input from either the client or the design team, from the client in the form of forgetfulness and from the design team as omission. Missing design information will inhibit the smooth flow of operations on site, therefore introducing delay to the scheduled project completion date.

The least significant factor in this category is dimensional inaccuracies. This factor is main a contribution from the design team. Although this factor is the least influential in this category, it does not imply that its effect is negligible because of the time it takes to clarify inaccuracies may result in delay in the delivery of the project.

Conclusions and Recommendations

Conclusions

Based upon the factor analysis conducted, it can be concluded that all factors identified for each sub-problem adequately describe the sub-problems by the value of the loadings obtained for each category of sub-problems, which were greater than 0.60 in all cases;

Client's ability to effectively brief the design team mostly influence project delivery time;

Clients' ability to contribute ideas to the design process getermines the extent of delay on the delivery of a project;

The lack of client understanding of project constraints influence project delivery time, and

Conflicting design information stemming from client input, result in project delivery time.

Recommendations

The following interventions should be given adequate attention with respect of mitigate the impact of delay on project as a result of contributions from both client and the design team.

At the brief / design stage, attention should be given to:

- Adequate briefing;
- Confirmation of client financial capability, and
- Design quality assurance / constructability reviews.
- Non knowledgeable clients relative to construction processes should endeavour to educate themselves on construction processes to enhance positive contribution to the construction process.

Clients' and the design team should be committed to quality management designers. Designers' quality management should focus on the following:

- Committed to providing a quality service;
- Production of correct and complete drawings and specifications;
- Coordinating and checking of design documentation;
- Conducting design verification through design analysis reviews, and
- Conducting constructability reviews.

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