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CLIENTS' PERCEPTION OF ARCHITECTS PERFORMANCE IN THE BUILDING INDUSTRY IN GHANA

By:

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DECLARATION

This thesis is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions.

.....

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Date: 27/04/2012

In my capacity as supervisor of the candidate's thesis, I certify that the above statements are true to the best of my knowledge.

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Dr. Emmanuel Adinyira
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Date: 27/04/12.

ABSTRACT

The aim of this research is to examine clients' perception of the performance of architects with respect to rating of importance over a set of performance criteria in the Ghanaian building industry. The aim was guided by the following objectives; *To identify the set of performance criteria for evaluating architects' performance. To assess clients satisfaction with the performance of architects based on the identified performance criteria. To formulate possible further steps that will enhance the performance of architects in successful project delivery.* A survey involving clients from both public and private sectors on recently completed building projects in Ghana was undertaken. Data analysis included comparing similarities and differences using standardized ratio, Mann Whitney U test or Mann-Whitney- Wilcoxon tests. The results showed that private sector clients are likely to be more concerned with cost, while public sector clients are more concerned with buildability of design. A total of 79 per cent of the criteria were similarly selected by both sectors with respect to importance of the criteria. Architects need to improve their performance significantly in about 82 per cent of the whole set of 28 criteria. Achitects performed better on the public sector than the private projects sector, and 14 per cent of the criteria were indicated as being statistically different in terms of architects' performance. The results provide vital feedback information to architects' or project managers' which can be incorporated in their future projects so as to ensure successful project implementation, and to promote relationship between project "parties" in the building delivery process.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

In the traditional setting of contracting building projects, architects play very important role in projects delivery in the construction industry. They serve as facilitators of the construction process, right from inception to commission of building projects.

Architects are one of the key built environment's professionals responsible for the design and supervision of all physical building projects (Daily Graphic; April 23, 2004). This role makes them the natural team leaders of building projects in the built environment. According to the views of The Aqua Group (2007) architects play natural leadership roles because of the fact that ideas (concepts) and the directions for the realization of all projects begin and end with them. The tasks of an architect are arduous and varied. This is because a project organization uses diverse project participants with varying objectives, carrying out multiple interrelated and inter dependent activities which need to be co-ordinated in order to achieve the overall project objectives.

In pursuance of this leadership role, architects bear the responsibility for the formulation of project briefs and the conceptualization of designs. They initiate and organize the tendering process, hand over sites to the selected contractors, and supervise and coordinate all activities on and off the site during construction. In addition, architects do not only certify payment to contractors but also the completion of projects and eventual handover to

prospective clients. In addition to these roles, they undertake physical planning of the environment.

In public service, the roles or functions of the architect are more profound. They serve as project administrators and development control officers (vetting and issuing building permits and inspection of physical developments). In addition, architects conduct feasibility studies, present project inception reports and manage public infrastructure development.

The ability of the architect to conceptualize designs in terms of plan-shape and size, most often, make them the first point of call when clients decide to either construct a new project or carry out refurbishment works on existing facilities. Above all, they lead the design team, hence clients look-up to them for successful delivery of their projects (Chappell and Willis, 2000). Besides, they are most often designated as contract administrators, and they have the highest delegated authority in any project under the traditional procurement method of contracting building works, except in management contracts (Murdoch and Hughes, 2000). According to The Aqua Group (2007), the responsibilities of architects entail carrying out the design of the works, and all of the supervisory duties under the contract on behalf of the employer. In addition, they serve as the channel of communication between the project team and the client except on the occasions where a project manager is engaged. Therefore, by acting on behalf of clients it is incumbent upon them to co-ordinate the activities of both the design and project teams, so as to make sure that clients' expectations and requirements are met at the end of the project.

In recent times, the performance of the construction industry in developing countries has become a source of concern to public, corporate and private clients. This concern is as a

result of the prevalence of project delays and excessive overruns in terms of cost and time, and building projects in Ghana are no exception (Frimpong *et al,* 2004). In many instances, these problems of overruns become so critical that, serious questions as to the competence of human factors such as improper planning and, poor implementation and co-ordination in the construction process are beginning to emerge (Elinwa and Joshua, 2001). While some blame clients or contractors for some of these developments, majority hold the consultants/architects as responsible, because they originate and conceptualize the designs (Elinwa and Joshua, 2001). Another possible reason for holding architects liable is that in performing their roles, they are not only perceived as responsible for providing appropriate designs, but also, provide efficient supervision of projects from inception to commission (Banks, 1993). By virtue of their position as designers and contract administrators in the building delivery process, architects ought to co-ordinate the activities of the project team in order to achieve projects' objectives. According to Chappell and Willis (2000), architects should endeavour to bring on board other members of the project organization, so that they can work together as a team during the design and the construction stages for successful delivery of projects.

Again, Chappell and Willis, (2000) noted that other members of the project team depend on architects (as originators of designs) to interpret their designs. Therefore, the ability of architects to actively involve them during the design and the construction stages of the project is important to its ultimate success.

Murdoch and Hughes, (2000) stated that, the accepted role of the architect under traditional procurement settings has long been to design the building, advice on the selection of the project team members, and generally represent the interest of clients as objectively as possible. By virtue of these roles bestowed on them, it is expected that architects should

objectively integrate clients requirements into their designs in order to meet their employers overall project objectives in terms of time, cost and value.

According to views of Emmitt (1999), some architects are overly enthusiastic about aesthetic and grandeur of their designs at the expense of the other vital elements of the building, and therefore, creates problem of over design. This is, because they have not critically bridge clients' needs and requirements in their designs, which are vital to the success of any construction project. Emmitt (1999), again said that, design is not the only key factor when clients make their choice of the design team. In the opinion of Dallas (1992), over design sometimes impedes smooth project implementation and, it is one of the possible key reasons for project failures. It is therefore of the essence that, architects guard against the problem of over design, because, it has the potential of leading to abortive project and the loss of professional fees (Dallas, 1992).

Besides, architects must try to avoid disputes. They must be vigilant to ensure that the procedures and the channels of communication that are adopted in managing projects and, the working relationship built, must produce an environment of trust and co-operation rather than discord. Kometa *et a.,l* (2004) suggested that leaders of construction projects should seek to develop non-confrontational approach to the management of construction contracts. Architects are no exception, because they are the contract administrators in the traditional procurement settings as prevailing in the construction industry in Ghana.

Clients mostly look out for the procedures and the overall management styles that architects adopt in assessing their performance on projects. According to the views of Latham (1994); the views of clients, their opinions, decisions and desires are the most important aspect of

projects successes that architects and their project teams should endeavour to achieve. In other words, they are the most important stake holders in the construction industry whose opinions should be upheld. Construction clients are largely seen as the only party whose opinion matters at the end of the day (Latham, 1994; Egan, 1998). They are the backbone of the construction industry, and without them consultants and contractors will be out of business. They hold the key to construction projects through their investments that are made in the industry. That's, clients have the ability to finance the whole construction process including the professional fees. Therefore, their needs should be of utmost priority to the design team especially, architects, who play the lead role in project organization under the traditional procurement setting.

Clients may invest in construction projects for a number of reasons, namely, political or economic. These reasons are dear to them, therefore no client will be satisfied with an architect whose performance does not commensurate the fees paid. For instance, poor planning and co-ordination of the design team and poor implementation of projects by architects could be perceived by clients as under performance. Moreover, this could also lead to time and cost overruns of projects. Under performance could also affect the quality of the works and the proper functioning of the elements. As stated by Lukumon and Kwok (2005), "under performance by project administrators most often causes great financial loss to clients, due to their inability to achieve project objectives and requirements".

Thus, it is expected that in performing these delegated roles under the traditional contracts, architects should endeavor to clearly understand their clients' objectives in order to satisfy them. According to Lukumon and Kwok (2005), satisfied clients promote sustenance of good business relationships. It also helps to foster partnership and the successful delivery of

building projects. Consequently, it has become very important that an assessment be carried out to examine clients' perception of the performance of architects. This will help architects to appreciate how clients perceived their performance in project delivery process.

1.2 PROBLEM STATEMENT

Architects are clients' first point of call after deciding to undertake building projects. This development confers on them leaders of the project team, except in management contracts. Key roles play by architects under the traditional contracts can be seen as; to design the building, advice on the selection of the design team, supervise the construction, and generally represent clients' interest at all levels as objectively as possible. As a result, clients depend on architects for successful delivery of their projects. In recent times, Ghanaian clients in the building industry are getting dissatisfied with the performance of their consultants. This is because many projects are experiencing extensive delays, which lead to cost, and time overruns (Frimpong *et al,* 2003). Sometimes, these incidents result into project failures, which become a setback to national development. In order to ascertain the facts of this discontention, a preliminary investigation was conducted. The complains from clients are summarized as follows; Inadequate planning and co-ordination of the design process resulting in delays and overruns; Consultants' inability to provide enough working drawings; Inadequate detailing leading to excessive variations during construction; Site instructions given without prior approval from clients; Some architects lack the understanding of construction methods. Problems of over design sometimes lead to tender figures far more exceeding budgets, and cause these projects to be abandoned.

The above complains are issues bordering mostly on design, and architects play the leading role both at the design and construction stages. Therefore, there is the need to assess their performance in relation to clients' priorities (i.e. objectives and requirements).

1.3 THE PURPOSE OF THE RESEACH

To examine clients' perception of architects performance with respect to a set of performance criteria in Ghanaian public and private sector building projects.

1.4 RESEARCH AIM

The aim of the research is to assess clients' perception of the performance of architects, because they play the lead role at the design and the construction stages. In addition, clients' are getting dissatisfied with the performance of consultants. The outcomes of the research will assist architects to have better understanding of how to meet construction clients' requirements. Architects ability to understand clients' requirements will help them develop better designs that are tailored to meet those needs, and thereby promoting good business relationships.

1.5 RESEARCH OBJECTIVES

To be able to achieve the above-mentioned aim, the following objectives are being established for the research:

- To identify and formulate the set of performance criteria for evaluating architects' performance based on clients' satisfaction.

- To assess clients' level of satisfaction with the performance of architects based on the formulated criteria.
- To identify and recommend steps to enhance the performance of architects in successful project delivery.

1.6 RESEARCH HYPOTHESIS

Clients in the building construction industry are not satisfied with the performance of administrators /Architects they engage to administer their projects.

1.7 RESEARCH METHODOLOGY

OBJECTIVE # 1

To identify and formulate the set of performance criteria for evaluating architects' performance

Various relevant literature were studied to assist in identifying and formulating the most appropriate criteria. The built environment's professionals in the various clients' organizations were also interviewed in order to gather a general data on the best form of criteria that could be adopted for carrying out the assessment. Various client organizations (in both public and private sectors of the industry) were also interviewed to help established a fair and balanced assessment criteria.

OBJECTIVE # 2

To assess clients' satisfaction with the performance of architects based on the formulated criteria

The first step towards measurement of the performance of architects on building projects is the determination of the measurement criteria. A twenty-eight point criteria was formulated to serve as the instrument for clients' measurement of architects' performance. These criteria were classified into four main categories namely; *Client focus, Buildability, Quality and Management systems*. This formed the foundation for the assessment of the building construction industry clients' level of satisfaction with the performance of architects.

Building construction clients from public and private organizations were first asked to rate each of the criteria in order of importance, and secondly assess the achievement by rating their architects' performance against the 'importance' rated criteria. Therefore performance in this context is objectively computed as the ratio of the level of *achievement* to the corresponding level of *importance* of any identified criteria. The *performance index* for each criterion was then computed as the ratio of the mean and standard deviation. The performance index (standardized ratio) was subjectively ranked to determine the architects' performance satisfaction for each criterion. The main instrument for collection of data for measurement of architects' performance was questionnaire survey.

OBJECTIVE # 3

To formulate some possible further steps that will enhance the performance of architects in successful project delivery

Structured questionnaires survey were used to gather data on clients views on the performance of architects that were significant to successful delivery of building projects. Each respondent was made to rank the level of significance of criteria in two parts of; importance and achievement on a 5-point scale of ranking (1-5). Mann-Whitney U-Test (a non-parametric test for 2-independent variables) was used to determine the significant relationship between importance of the criteria to clients, and the achievement of architect on the projects they have been engaged on. A relationship was obtained in light of the criteria adopted for the performance assessment of the architects.

1.8 RESEARCH JUSTIFICATION

Architects are usually the first point of call when clients deicide to undertake building construction projects. Even where project managers are consulted first, Architects are immediately introduced to work on the design concept and, come out with the full design details. Architects do not only design the buildings, but also advice clients on the selection of the design team members, supervise the construction process, and generally represent clients' interest. As a result, clients depend on architects for successful delivery of their building projects. Therefore, Architects non-performance can lead to dysfunctional building project organization and lack of confidence on the parts of clients in the industry. Moreover, the growing evidence of clients' dissatisfaction with architects' performance call for an investigation and assessment of every performance parameters and arrive at practical

recommendations for improvement. This shall be in consonance with the general industry's performance improvement.

1.9 SCOPE OF STUDY

The research focused on purposive sample of clients from public and private sectors who have completed building projects within the past five (5) years, in Accra and Kumasi metropolitan areas. For public sector projects, the study concentrated on medium works (Project value: GH¢ 50,000 - 2,000,000) as defined in the manual of the Public Procurement Act, (Act 663, 2003). The same range of project value was used for private clients to allow for good comparison.

1.10 RESEARCH LIMITATIONS

Apart from limited time available for completing the study, respondents were reluctant in providing data required. Both the interviewing and the questionnaire distribution stages were characterized by initial unwillingness on the part of interviewees and respondents. This was lately overcome through persistence and giving assurance that confidentiality of the assessment information would be maintained.

1.11 STRUCTURE OF THE DISSERTATION

The dissertation has been structured into five (5) major chapters; Chapter One is the introduction of the research. It contains the background of the study, the problem statement, the purpose of the study, aims and objectives the scope of the study, research justification questions and the methodology. Chapter Two takes into account, all the relevant literature that was critically reviewed to determine the list of criteria that clients look out for in assessing the performance of architects, and including clients' requirements and of architects' responsibilities.

Chapter Three presents the procedure for the study. The research methodology discussed here, includes the type of data used, and how it was collected. Details of the questionnaires used for the survey, together with the method employed to analyse the data were outlined here. Chapter Four is dedicated to the presentation of the data collected, its analyses and discussions that were generated. Chapter Five showcase all the inferences, summary of major findings and the significance of the study. In addition, this chapter brought in the highlights of all the conclusion and recommendations; the future of the research of the research is promulgated in this chapter.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

Most industries are dynamic in nature and the construction industry is no exception. Its environment has become more dynamic due to the increasing uncertainties in technology, budgets, clients demand for accountability and development processes. According to Chan (2004), these demands made by clients in recent times have put an enormous pressure on the industry's professionals, especially the architect to design and deliver projects that are within the "iron triangle" of time, cost and value.

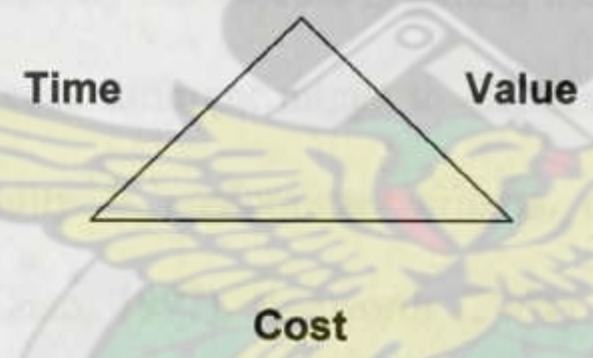

Figure 2.1: *The Iron Triangle of Time, Cost and Value (Kwakye 1997)*

The above development sometimes exposes architects *who double as leaders of design teams and contract administrators* under the traditional procurement settings to criticisms from clients. They are mostly criticized for designing buildings that are costly and delivered well over the agreed construction period. Various authors have written extensively about the above critiques. According to O' Reilly (1987), problems of overruns may be as a result of the following; lack of close involvement of clients during the development process; lack of architects understanding of project priorities, the type of procurement methods, and the overall management bandwidth of projects.

Hubbard (1995) thinks that the ability of architects' to clearly understand project priorities and the type of procurement route to be adopted; getting clients closely involved in the development process and adopting good innovative project management approach would significantly result in their understanding of the concept of project success. In view of the above discourse, Walker (1996) said that the problems of overruns and the recent clients' criticisms should be a wake-up for all construction professionals to equip themselves with project management knowledge and skills. This will help improve their understanding of the concept of project success, and to deliver projects successfully - in terms of time, cost and value.

According to Chan (1997), though the concept of project success has remained ambiguously defined in the construction industry, its success is almost the ultimate goal for every client. However, project success means different things to different people. While some writers consider time, cost and quality as predominant criteria, others suggest that success is something more complex (Chan, 1997). Ashworth (2004) thinks this complexity entails other issues such as cost –in-use or whole life costing. According to Ashworth (2004), the success of any construction project can be measured against several set criteria such as issues on buildability, procurement methods, client focus and many more. The purpose of this review is to identify the set of criteria that clients could use to assess the performance of architects. Ashworth (2004) said, a combination of these criteria is necessary in order to provide successful project delivery that will satisfy clients.

2.2 CLIENTS

2.2.1 Construction clients

To a construction team (Aqua Group, 2007) a client is the body that has the authority to approve expenditure on a project, the form the project take, its timing and pays the fees. A construction client can be defined as the person or organization responsible for commissioning and paying for the design and construction of a facility (e.g. building, road or bridge), usually (but not always) the owner of facility being commissioned (Kamara *et al.*, 2002).

The client can also be the user of the proposed facility, or they (i.e. the client and user) may be separate entities. These include the owner, if different, users and other identified persons, groups or organizations who influence, are affected by the acquisition, use operation and the demolition of the proposed facility (Kamara *et al.*, 2002). Thus, the 'client' (buyer of construction services) is a body or entity that incorporates other interest groups (See Figure 2.2). The extent to which these are involved depends on the kind and scale of the project.

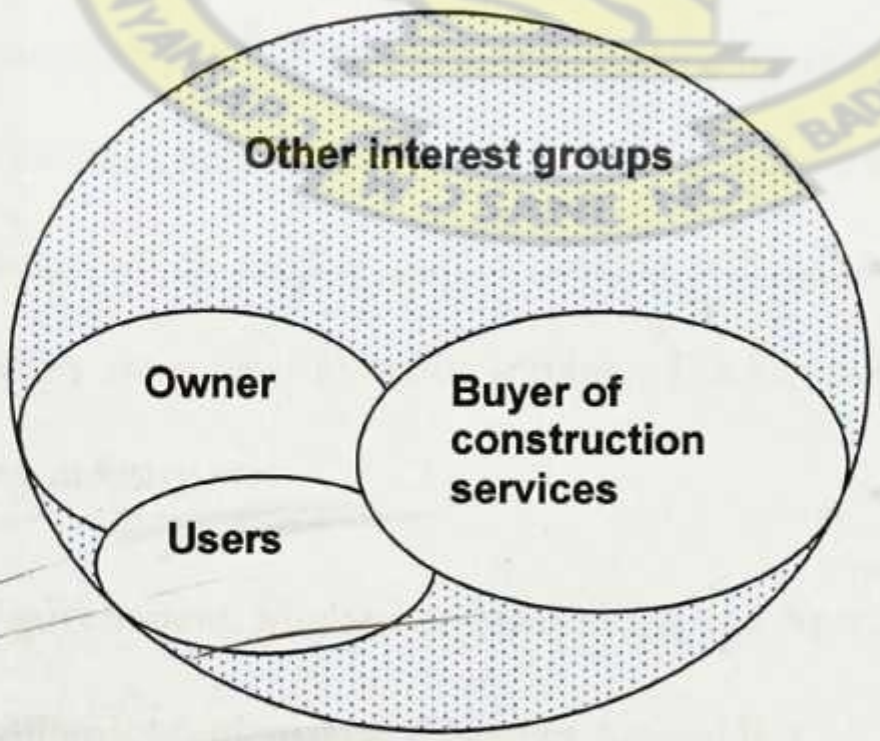

Figure 2.2: *Components of 'client body; Source: Adapted from Kamara et al., (2002)*

2.2.2 Types of construction clients

The construction industry looks up to its numerous clients for works and, according to Kwakye (1997), they are generally classified as either public sector or private sector clients. Clients are either individuals or organizations that contract the construction of facilities either for their own use or for someone else's (Kwakye, 1997).

2.2.2.1 Public sector clients

These are public authorities whose operations are governed by Acts of Parliament. For instance, every construction product that is funded by public money in Ghana must be procured through the guidelines as stipulated by the Public Procurement Act, 2003 (Act 663). Public sector clients such as Metros, Municipal, District Assemblies (MMDAs) and Ministries, Departments and Agencies (MDAs) act as agent for the central government, who exercise control over their capital building project programmes and expenditure.

Public sector clients comprise of all publicly owned organizations that have the authority to raise finance to commission building projects, and their source of funding is via taxation on the authority of the central government (Kwakye, 1997). Ashworth and Hogg (2007) said that these organizations which receive public funding will naturally be concerned with accountability since they are subject to public scrutiny. The key public sector clients within the Ghanaian building industry are:

(i) Central government, Ministries, departments and Agencies

(ii) Metropolitans, Municipals and District Assemblies

(iii) Public corporations: GBC, GPHA, Ghana Coco Board, Ghana Railways Authority, etc,)

(iv) Health institutions; KATH, KTH, etc.

2.2.2.2 Private sector clients

According to Kwakye (1997), these are private companies who build for leasing, renting, sale or own occupation. The central government only exercises limited control over their operations. They include private individuals, property development companies and corporations which construct new building and refurbishment works.

2.2.3 Importance of clients to the construction process

As the initiators and financiers of projects, clients are central to the construction process, and considered to be the driving force in the construction. Therefore, the ultimate of all professionals/parties in any project organization is to satisfy fully the requirements of the clients (Kamara *et al.,* 2002). This invariably depends on the project organization, design quality, managerial skills of the construction team, and the quality and suitability of the construction materials (Sanvido *et al.,* 1992).

According to Kamara *et al., (*2002), the process of satisfying clients' requirements begins with a clear definition of what those requirements are. In line with this, Chang and Ibbs (1998), stated that the clear definition of these requirements requires that architects focus more on their clients, in order to effectively capture their 'voice' in the design and the construction process.

Kwakye (1997) said that Clients are the key to the whole construction production process from inception to completion, and sometimes to post-construction. Without them, there would be no construction. They initiate the construction process by commissioning various professionals to build to specific requirements. According to Kwakye (1997), there are varieties/components of clients within building construction industry, and they undertake building projects for various reasons. Clients select their projects timing, priorities, cost limits and often determine the contractual methods.

Kwakye (1997) stated further that, some clients are well informed and, hence, know what they want and take decisive steps to achieve it. Others however, have very little knowledge about construction and need help and guidance to formulate their requirement in order to match to the available budget. Ashworth and Hogg (2007) could not agree any better when they stated, "Clients who regularly carry out construction work are much better informed, develop their own preferences and will not require the same level of advice as those who build occasionally.

According to Kwakye (1997), when a client perceives the need for new construction or refurbishment, the decision to undertake the project is made in the midst of various environmental forces, which may be political, social, technological, economical, educational or legal, and within a time scale. The figure (2.3) below illustrates the cycle of processes that clients undertake in order to acquire a construction product.

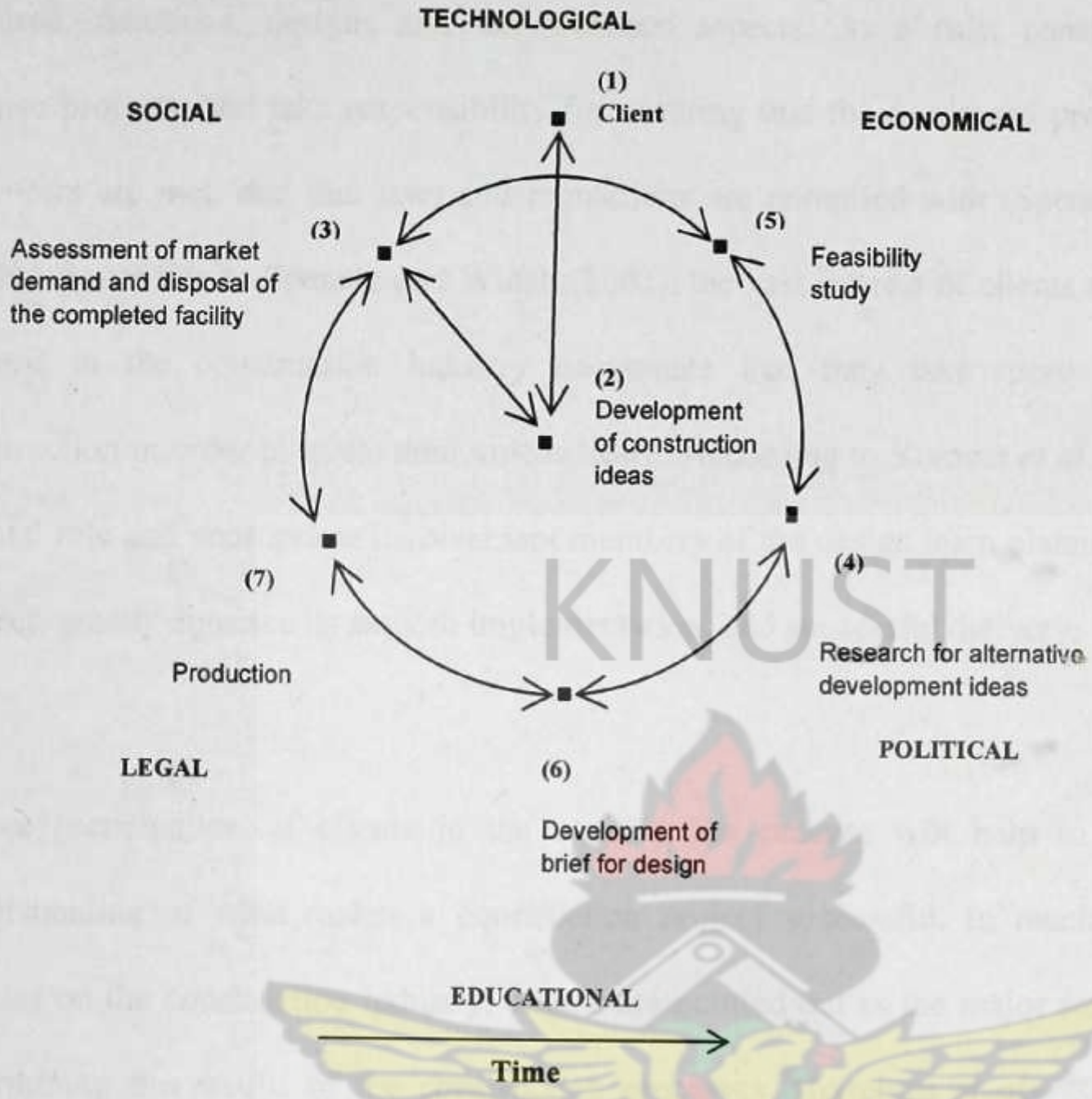

Fig. 2.3: Cycle of *client's development process.* Source: Adapted from (Kwakye (1997)

As the initiators of the construction process, clients normally develop the construction ideas, then study the markets to identify user or potential user demand (where the development is for sale, leasing or letting) (Kwakye 1997). Once a favourable demand is established, some clients may carry out the project through its established in –house project department. However, most times construction professionals (architects mostly being the first to contact) are engaged to carry out feasibility studies, research into alternative course of action, and then develop the brief for the design of the construction product.

The construction client often also represents many different interests in terms of services required, functions, designs and interpretation aspects. As a rule, construction clients finance projects, and take responsibility for ensuring that the needs and preferences of the end users are met, and that laws and regulations are complied with (Spencer and Winch, 2002). According to Spencer and Winch (2002), the vast interest of clients and their vested interest in the construction industry necessitate that they take more active role in construction in order to make their voices heard. According to Kometa *et al*., (1995), active clients' role and appropriate involvement members of the design team planning stage of the project, greatly enhance its smooth implementation, and successful delivery.

Active participation of clients in the construction process will help to improve their understanding of what makes a construction project successful. In much of the recent debates on the construction industry, clients are pointed out as the major steering force for determining the results of the construction processes (Bertelsen *et al.*, 2002; Byggherre Forum, 2006).

Findings from research conducted by Kamara *et al*., 2002, pointed out that increase active participation of clients in the building process have significantly enhance their understanding of the inherent complexities of construction projects. According to Byggherre Forum (2006), construction clients are becoming increasely interested in a more value-based and operationally oriented management process than architects' traditional approach to the management of projects.

Therefore, it is reasonable to suggest that the construction industry needs professionals such as architects to be knowledgeable in management strategies that will promote delivery of successful projects. This, for instance, has led to a need for experts such as architects to understand the differences between strategic/external and operative/internal management processes without focusing too much on building-related solutions.

Such experts can not only act as clients' linkage between business development and facility planning, but also, oversee the construction process without having all the facts stated and finalized between the traditional construction phases. This implies a possibility for project architecture professionals in the construction industry to develop and provide expanded services to clients. It also implies a need to focus on the construction project from a process perspective rather than from the construction project goals as such.

2.2.4 The 'voice of the client'

The 'voice of the client' is similar to the concept of the 'voice of the customer'. The 'voice of the customer' was used in the manufacturing sector to describe the active and systematic process of establishing and incorporating the 'true' wishes of customers in the development of products (Griffin and Hauser, 1993). According to Kamara *et al.,* (2002), the 'voice of the client' (or clients requirements) is the collective wishes, perspectives and expectations of the various components of client body that needed to be satisfied. These collectives wishes or requirements describe the facility/product that is tailored to meet clients' objectives or business need. Therefore, clients' requirements constitute the primary source of information for all construction projects and, therefore, are vital to the successful planning and implementation of projects.

The need for establishing and adequately incorporating the voice of the clients requirements reflect the changes within construction industry (Kamara et al.,2002). According to Latham, (1994); Egan, (1998), this need has led to the repeated call for the construction process to be more client-oriented. Latham (1994) stated that the inability of the industry to be more client-focused has led to the situation where construction professionals (mostly architects) design for aesthetics and posterity needs, and not so much that of clients expectations.

However, with the increasing sophistication of the expectations of clients and the general recognition of their importance role in the construction process, the industry is now required to deliver better value for money by renewing its focus on client requirements (Egan, 1998). Furthermore, as a service provider the industry should seek to be more client-focused (Kamara et al., 2002). A first step in this direction is the effective processing of clients' requirements.

2.2.5 Clients' requirements

At the heart of the construction industry are the clients, who initiate and finance construction projects. The acknowledged importance of clients as the driving force in the construction industry has led to repeated calls for the construction industry to deliver better value-for-money on clients' investments (Kamara *et al.,* 2002). Achieving client's satisfaction has been identified as one of the most important challenges in construction projects. As most clients relied on their consultant team for advice, it is important that the architect and the design team l characteristics, functional performance criteria and quality standards. Thus, project briefing is crucial to the success of a project (Yahya *et al.*, 2007).

As a result, it is vital that the construction industry's professionals such as architects understand their clients' requirements in order that they may provide best of what clients want (Blyth and Worthington, 2001). In consistence with the above discourse, Chang (2004) stated the best approach to effective capturing of clients' requirements within planning and implementation stages of the construction process is to classify the requirements into major categories. According to Chan (1997), the best approach to assessing the success of a construction product is determine whether all the salient clients requirements in terms of *cost, buildability, time, value and performance* are integrated in the product. Similarly, Atkinson (1999) also defined project success as a composite of time, cost, quality, efficiency, buildability and benefits to stakeholders. Figure 2.4 depicts the diagrammatic presentation of the major components of clients' requirements that promote successful project delivery.

According to Kamara et al., (2002), the adoption of this approach will enable clients to define and communicate their requirements and expectations for their proposed facilities, in line with their overall political, social, technological, economical/business objectives. It will also allow the construction industry (architects, engineers, Quantity surveyors and contractors) to deliver products and services that satisfy clients' needs, and thereby providing better value for money. Architects need to capture and process clients' requirements through their designs in order to meet clients' expectations.

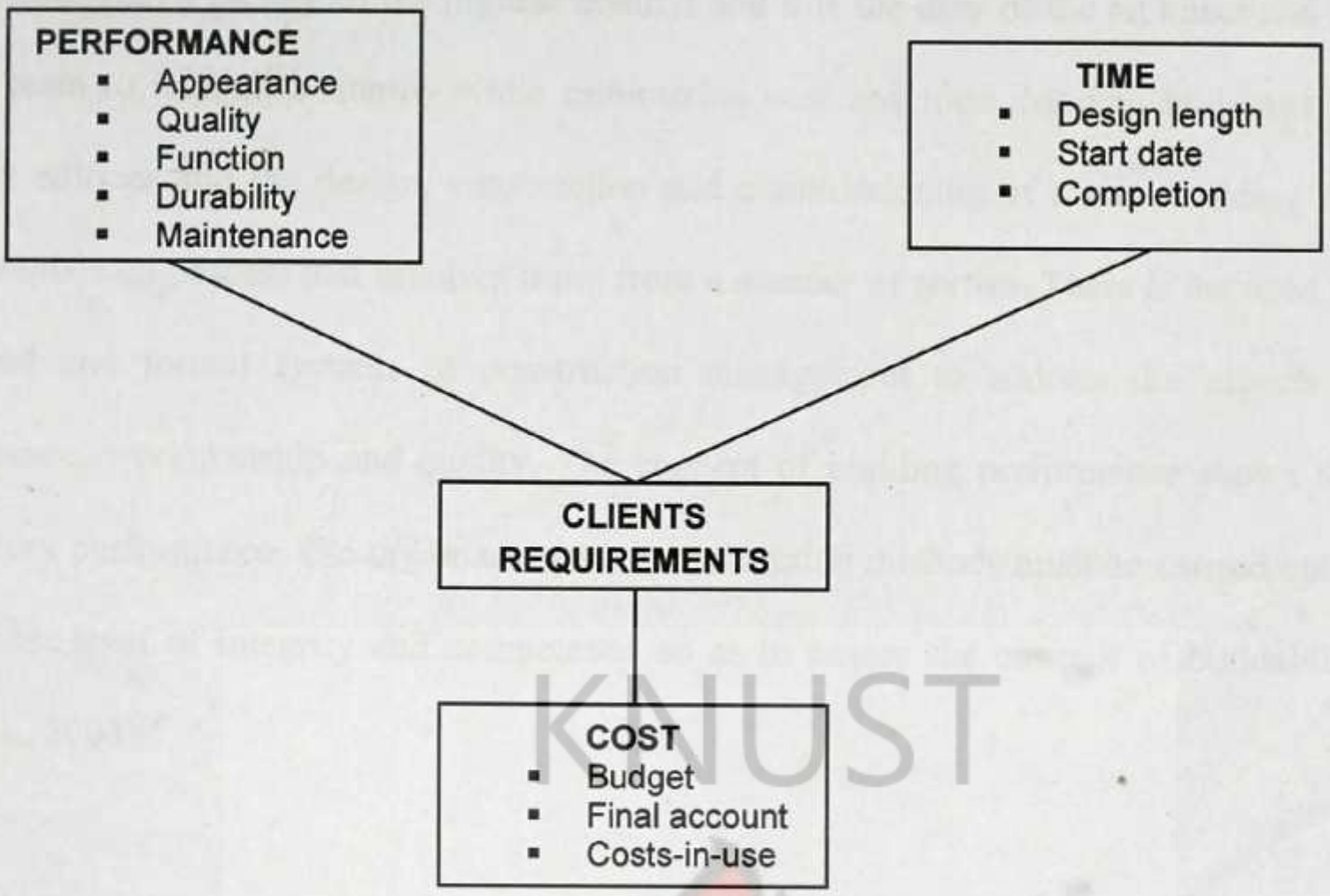

Figure 2.4: *Components of clients' requirements (Kwakye 1997)*

2.2.5.1 Cost

Excellence in building and construction is attained only where appearance, soundness of construction and usefulness have been developed together in a fully integrated manner. In today's economy, excellence in design is achieved when the building is procured at a reasonable cost, both in respect of initial costs and also during use Ashworth (2004). Clients often require their projects to fulfill a function that is related to spatial factors such as the numbers in a school or seats in a stadium, since these often determine some form of building cost criteria.

2.2.5.2 Buildability

Analysis of the construction process is commonly expressed in terms of establishing equilibrium among the three primary concerns of time, cost and quality. Any client would

want to construct a facility of the highest quality; and it is the duty of the architect and the project team to maximize quality while minimizing cost and time. Modern buildings are complex edifices and the design, construction and commissioning of a new building is a long complicated process that involves input from a number of parties. There is the need for structured and formal systems of construction management to address the aspects of performance, workmanship and quality. The concept of building performance shows that satisfactory performance, site organization and construction methods must be carried out to the highest level of integrity and competence so as to ensure the concept of buildability (Obiegbu, 2004).

Buildability as a term is not well known, and in fact, this term is not found in dictionaries, but in practice the concept has been known since the beginning of the construction industry. In ancient times, the design was dictated about how the project should be built, and the construction was done by the master builder (Uhlik and Lores 1998). Bamisile (2004) defined buildability as the ability to construct a building efficiently, economically and to an agreed or specified standard from its constituent materials, components and sub-assemblies.

A widely accepted definition of buildability is that of the Construction Industry Research and Information Association (CIRIA, 1983), which quite explicitly states that 'buildability is the extent to which the design of a building facilitates ease of construction, subject to the overall requirements for the completed building. Buildability, is defined by the Construction Industry Institute (CII), as the "optimum integration of construction knowledge and experience in planning, engineering, procurement and field operations to achieve overall project objectives". Fisher and Rajan (1986), defined buildability as a measure of the ease or expediency with which a facility can be constructed."

Also, buildability is often described as integrating construction knowledge, resources, technology and experience into the engineering and design of a project. Buildability is increasingly becoming a major requirement in building practice. The industry's clients are continuously demanding the best value for money, in terms of the efficiency with which the building is carried out. The integration of good buildability into good overall design is the responsibility of the design team. Research in Uganda and elsewhere in the world have shown that good buildability leads to major cost benefits for clients, designers, and builders (Tindiwensi, 1996).

Secondly, the achievement of good buildability depends upon both designers and builders being able to see the whole construction process through each other's eyes. This is the biggest problem because it requires expertise in the two aspects by both roles and moreover, the procurement practices do not favour this. Involving people with construction knowledge and experience at the very beginning of the project results in maximizing benefits (Lores 1997).

According to Lores (1997), research has shown that the integration of construction knowledge from experts during the planning, design and procurement phases of a project brings extraordinary benefits into the delivery of the project. This is due to the fact that these are the phases in which one is able to influence the overall project the most. To review the design after completion is not a buildability programme. It has to start from the beginning, because it is very difficult to make substantial changes in the design once you are through with it.

Buildability reviews or considerations have to be started at the same time as the initial project planning and should continue during the entire life of the project. In short, buildability optimizes the following elements from start to finish when reviews are carried: Overall project planning, Planning and designing, Construction – delivering schedule, Cost and estimate, Construction methods (Kamara *et al.*, 2002).

In his view, Ashworth (2004) said design methods which need to be worked within the general constraints imposed technical, legal, functional and economic framework. These technical constraints according to Ashworth (2004) impose limitations in respect of the characteristics of materials available, the structural form required, the necessity of integration engineering services in the project, and the capability of the constructional process which may be used.

Ashworth (2004) went on further and said, designers (Architects) may assume that errors on site can be reduced almost to nothing, but the practical aspects of construction operations today indicate that this is incorrect, and where a design relies on this assumption it will fails. The technical constraints must take into account the general requirements of buildability, which may result in modifications to the design during buildability reviews to ensure good building methods.

2.2.5.3 Time

Project duration or completion dates may be critical to the success of a project, and in some situation if not met could lead to total project failure. Whilst most clients are likely to have a desire for an early building completion, it is important to distinguish between this and true

need since attempting to meet this objective or early completion is likely to have consequences on the other project requirements (Ashworth and Hogg, 2007).

According to Ashworth (2004), once clients decide on a development project, they are generally in hurry to have their completed project. However, the characteristics of the design will have influence on the methods to be adopted by the contractor for its construction, and this will in turn have an important influence on the length of the construction period.

In view of the above, Kwakye (1997), said one method of measuring the success of a project is whether it is available for commissioning by the date promised. In accordance with this discourse, Mansfield, *et al*., (1994) commented that it is crucial for architects to have sound knowledge of how to provide buildable designs, and better understanding of the various procurements routes for their designs in order to deliver them on time.

2.2.5.4 Performance

Performance can be defined as the accomplishment of a given task measured against preset known standards of accuracy, completeness, cost, and speed. Performance is also defined as the act of performing or carrying into execution of a task, or the achievement of a set target. In the views of Parmenter (2007), if the consultants have been able to translate their clients' requirements and expectations into results through the design and the project team, the project is successful, and client would be satisfied. According to (Griffin and Hauser, 1993), clients are the customers of construction industry's products. Therefore, their requirements and expectations need to be addressed effectively by the industry's professionals. The

ability of the architects-the lead consultants in building industry to meet clients expectations is major yardstick in measuring of their performance (Kamara et al., 2002).

In the performance of their tasks, architects produce plan concept to meet their clients' requirements in most efficient manner. The project when completed must have the aesthetic merits. The architecture, the engineering, and the works (in terms of quality requirements) on site must be done in a manner that will protect the client against his own inexperience (Ashworth, 2004). Hubbard (1995), noted that although the above mentioned may be in part a value judgment, however, there are several factors by which these requirements can be appraised.

The quality of the finished work would have been defined in the specification, but this will be a measurement of assessment. According to Ashworth (2004), this will necessitate an adequate specification initially, including the selection of an experienced contractor and effective supervision throughout construction operation on site. This is because poor quality or defective works, or poor functioning of facilities (which can led to low utilization of the commissioned building), and the ultimate blame put usually put on the architect or the contractor (Kamara *et al.*, 2002). According to Fidelis *et al.*, 2007, quality management in the design and construction of building projects is a crucial factor in meeting clients' requirements. In support of the above, Bamisile (2004), said that one of the major reasons for clients' dissatisfaction on building projects is poor quality of the final products.

Inadequate design and detailing, and the incorrect choice of materials are elementary problems that can become obstacles to proper project performance. The client needs to be satisfied that the completed structure meets the needs and requirements in terms of the structure's functions and spatial design (Ashworth, 2004). A further consideration to the

above is that of the future maintenance requirements once the building is use. In the light of this, Ashworth (2004) said that many clients have seen the advantages of architects providing designs in terms of the total project rather than on the basis of initial design alone.

2.3 PROCESSES OF CAPTURING CLIENTS REQUIREMENTS/ USER DEMAND

The *process* here refers to the process of capturing and achieving client's objectives. Focus here is on the strategy of the briefing process and the management of the construction process. According to O'Reilly (1987), the briefing process is "a process running throughout a construction project by which the requirements of the client and other relevant stakeholders are progressively captured, interpreted, confirmed, and then communicated to the design and construction 'team'. This is one of key areas where most architects fail to live up to clients' expectations (Kamara *et al*., 2002).

According to Kamara *et al*., (2002), briefing is the process of capturing the expressed needs or desires of the client in the form that translate into design. This description broadens the customer perspective, emphasizes cyclic aspects and clarifies the briefing activities (Barrett and Stanley, 1999). Strategic briefing provide clients/stakeholders the opportunity to identify, clarify, analysis, formulate, and confirm their perspectives on the design (Rechtin and Maier, 2000; Spencer and Winch, 2002) – a process with the overall aim of continually co-coordinating the client's business and the planning of the facility.

Strategic briefing is a concept that can be adopted by architects to enable them come out with better outline and understanding of clients objectives. This was a British concept introduced at the beginning of the 1990s to reduce the limitations experienced in traditional

specification development when both public and private clients' objectives were in a state of constant change (Blyth and Worthington, 2001).

Strategic briefing springs from the current operational needs of clients, but also takes a longer perspective and focuses on the operation's strategic development plans, its prospects, and the building's potential for adaptation for other uses. It is a matter of identifying the activity that is to be housed in the building, how it might change, and the factors that affect these changes. Bertelsen *et al.* (2002), for example, found that the identification of the strategic themes of the briefing is of fundamental importance for the architect's possibilities to manage the construction process successfully.

The strategic/tactical briefing process helps define the course of action by way of outlining the operations. An operative brief considers those aspects that can be adapted and changed as the operation changes. It includes operational and building-related performance specifications, guidelines for layout, and interior design concepts that together form the foundation for the individual organization's use of the premises.

A workshop held in February 2003 (Ryd, 2003); Titled "Clients' goals and the construction project management process", revealed trends that urge the re-evaluation of the briefing process. The need for better briefing with the focus on end-users is increasing. The findings also pointed to difficulties for construction projects to deliver what the user-clients need. This was considered to be a lack of systems and methods to keep track of user client demands sufficiently and in a satisfactory way during the design and construction stages. Goals need to be iterated and validated on a regular and coherent basis throughout projects,

and increased interest for process-oriented and strategic briefing was also indicated. According to views of Ryd (2004) design brief should be able to serve as carrier of clients' information during the construction process.

According to Fristedt and Ryd (2007), the findings from the workshop have laid bare the importance of proper design and construction briefing. In support of this, Kamara *et al.*, 2002, said that poor briefing is always evident, because it represents the quality of demand in the procurement of building construction products. During the last decades, the need for better briefing with the focus on end-users has been increasingly recognized in professionalizing the demand in building and construction among clients, industry and researchers all over the world (Kamara *et al.*,2002).

Emphasis is put on a desire to manage the brief with a more strategic focus on end results, facilitating the client's business process rather than focusing on the technology of building parts and components. In few countries such as Australia, Denmark, and Sweden, construction clients associations have been initiated in order to empower the position of the client/principal in enhancing innovative construction practices. One of the major success factors of these associations is in better briefing, i.e. in the effect of sound decision-making in early stages of the process – the earlier the better (Ryd, 2003).

Granath and Hinnersson (2002), pointed out the difficulties for construction projects in delivering what user-clients need. Their findings mentioned that user demands, although more or less were captured during briefing processes, were hard to define. It is also difficult to measure the levels of construction of the projects, and thus, could hardly be validated during the construction (production) phase. Functions defined in the briefs were described

as cumbersome to communicate and translate to production activities. Findings from Rezgui *et al.,* (2003) also considered that there were lack of systems and methods to sufficiently track user /client demands on projects satisfactorily.

According to Granath and Hinnersson (2002), a suggested method to address this issue, at least partly, is that architects should involve other key construction professionals in the brief development process. This will help in iterating and validating project goals with project participants on a regular and coherent basis throughout the project. This was considered by the workshop participants as a better way of developing the briefing process; and a way of achieving proper monitoring and assessing of the brief during all phases of design, construction, commission and use. However, the work could not clarify and present ideas on how to relate specific client goals and demands to the outcome of construction projects. Consistence with this, Moore (1996), said that the causes of some of the construction problems are largely due inadequate cohesion among the industry's professionals.

Ryd (2003), outlined the differences between the various types of briefing processes, depending on the chosen scope. Some of the processes aimed at satisfying internal objectives of the construction processes, others were intended to meet external efficiency such as satisfying the client's business goals. Furthermore, a trend of increased interest for process-oriented and strategic briefing was suggested in addition to increased research on collaborative working among the project team that architects' lead.

Also, communication and interaction capabilities are considered vital for architects. The growing awareness of the role of the construction client in design and building process

innovation points to the need for the development of expertise among architects in the fields of briefing, procurement, and management (Cooke-Davis ,2002). According to Cooke-Davis (2002), the above mentioned expertises are considered as the key aspects in reforming the briefing and construction processes, which ultimately, become yardsticks for measuring their performance.

2.4 CRITERIA FOR ASSESSMENT OF ARCHITECTS' PERFORMANCE

Various attempts have been made by different researchers to determine architects' responsibilities within the building delivery process (Symes *et al.*, 1995; Chang and Ibbs, 1998; Banks and Nicholson, 1993; Emmitt, 1999). Latham, 1994 and Kamara *et al.*, 2002 highlighted on clients' requirement issues - architects to *focus on clients* during the briefing in order to capture their needs and integrate them in the design. Literature search has also revealed extensive work on issues of *buildability* and quality that affect successful delivery of building projects (CIRIA, 1983). Sidwell (1982) also pointed out that the ability of the architect to exercise overall *managerial control* over the planning and implementation stages can be an important element in achieving project success. Thus, criteria drive from 'client focus', 'buildability', quality of the works' and management systems/style', the design, etc., can be adopted as the bases for carrying out clients' assessment of architects' performance on building projects.

Several other literatures abound with lists of criteria associated with the domain of architect/consultant responsibilities. Some of the commonly identified standards that were used in assessing performance of projects include design criteria in relation to time, cost, and quality, etc., but no general agreement on suitable criteria set that can be readily

adopted was found. However, in the quest to indentify the most suitable set of criteria that can be used statistically and scientifically in assessing the views of clients on the performance of architects, a category set of criteria were adopted. In order to undertake this research successfully, four (4) sets of category headings for the criteria were chosen. They are; 'Client focus', 'Constructability/Buildability of design', 'Quality of works' and 'Management systems'.

2.4.1 Client focus

Clients are the core of the process and their needs must be met by the industry (Latham, 1994), hence performance criteria should reflect owner requirements and expectations (Barry, 1991). Egan (1998) noted that most clients are not only interested in the finished product, but also its cost, whether it is delivered on time, the quality and how the building functions during usage. Thus, the ability of the architect to concentrate on the view of the consumer through the process of capturing all the requirements of the client would lead to a view of making construction a much more integrated process. Therefore, according to Coxe, (1980), architects should endeavour to integrate clients as part of their firms' organizational structure. In support of the preceding statement, O'Reilly (1987) said that buildings do not only design to serve as housing clients' main activities, but are expected to create an image for commercial, cultural or political ends, to influence land use or property values and to give aesthetic satisfaction.

Another crucial factor that enhances project success is communication. In his view, Emmitt, (1999) said good communication between client and architect is crucial, not just for the success of a project but also for long-term client-architect relationships. In support of the

above statement, Maister, (1993) put it succinctly that *the better the understanding of the client's needs the better the competitive advantage of the architectural firm.* According to Kaderlan, (1991) satisfied clients are the most important source of new work, either through further commissions or through their recommendations to others.

Criteria identified under "*client focus*" include; understanding client corporate objectives, forethought and consideration of user requirements, identifying and prioritizing project objectives, analyzing the design concepts and requirements, the project was designed within budget, completion of design on time and design conformance to owner's requirements.

2.4.2 Constructability/buildability of design

The Construction Industry Research and Information Association (CIRIA, 1983) defined buildability as "the extent to which the design of a building facilitates ease of construction, subject to the overall requirements for the completed building". According this report, ease of construction can be achieved through proper analysis of buildability issues with focus on operational and economic features, which are mostly, factors that directly affect the productivity of site processes and the efficiency of site management.

Even though, Tatum (1987) and Eldin, (1988) said that, constructability or buildability is not new in the construction field, and according to O'Connor and Tucker (1986), its planning requires the optimum integration of construction knowledge and experience, which together helps to engineer designs that achieve the overall project objectives. Whilst the CIRIA appreciates that ease of construction may be influenced by many organizational,

technical, managerial and environmental considerations, the other major contribution was thought to lie in *those* factors which fall within the influence or control of the design team (Griffith, 1984). Constructability/buildability is a project management technique used to review construction processes from start to finish during pre-construction phase. It is to identify obstacles before a project is actually built to reduce or prevent errors, delays, and cost overruns. According Moore (1996) technical review of the design is as important as an aesthetic review to ensure that the design is on-track, buildable and deliverable. Regular reviews save time and money by avoiding re-working of designs.

The architect should, therefore, give the necessary attention to buildability issues right from the conceptual planning stage of the design. Buildability reviews can also be tackled through effective supervision and project control (Kometa *et al*., 1995). This will not only allow timely delivery of the project but also go a long way in reducing cost such as the minimization of non-productive times within site operations. Buildability reviews during construction process can also help to drive out waste and enhance cost and programme certainty, through properly planning of the works and construction logistics and using sound construction techniques.

According to Aqua Group (2007); Architects, under the terms of their employment, are normally required to visit the site, at intervals appropriate to the stage of construction, to inspect the progress and quality of the works, and to determine that they are being executed in accordance with the contract document.

Criteria identified in this group include; completion and simplification of design, standardization of element, dimensional co-ordination of element, flexibility in design,

knowledge of performance characteristics of materials and components, constructability review was carried out and effective participation in supervision and control.

2.4.3 Quality of works

While there have been various definitions for quality, it could be defined within the construction industry as fitness of purpose (CIRIA, 1985), the effective achievement of agreed goals between client and contractor (Fan, 1995), meeting the legal, aesthetic and functional requirements of a project (Arditi and Gunaydin, 1997) or conformance with the requirements of clients (Atkins, 1994). Taylor and Hosker (1992) highlighted that architectural firms must give their clients confidence both in the quality of the service they provide and in the quality of the buildings they produce. They must be able to accomplish this cost effectively in order to stay competitive. Macdonald and Piggott, (1990) noted that total commitment to quality is seen as the best way of consistently delighting the customer through quality service and quality products.

Criteria identified in this group comprises aesthetics and quality of design, high quality specification, production of quality management strategies, assistance in production of quality manuals, non-rework and efficiency of design, design conformance to codes and standard and assistance in production of construction inspection and testing program.

2.4.4 Management systems

Sidwell (1982) and Ireland (1984) noted that managerial control is a key element in achieving project success, being related significantly to all measures of success. Rowlinson

(1988) also concluded that a high level of administrative ability in the project team leads to reduced time overruns, which in turn leads to increased satisfaction of client. Today, management systems have been incorporated in project management which has emerged as a distinct profession, leading to further fragmentation of the building process (Smith and Morris, 1992) and further loss of control of the building process by architectural firms (Pawley, 1990). According to Bertelsen *et al.,* (2002), architects inability to institute sound management systems at the briefing stage of the building process has sometimes led to many instances of poor co-ordination and supervision of the design team.

From the business stand point it makes sense to adopt project management methods and principles for managing project. This adoption helps to ensure the long-term viability and profitability of firm while maintaining the all-important link between client and architect for producing quality architecture (Emmitt, 1999). Walker (1996) also noted that from the client's perspective a situation where architecture and project management are combined in one firm is likely to be attractive. However architectural education continues to be concerned first and foremost with design.

According to Symes *et al.* (1995), only 21 per cent of architects interviewed in a recent survey in UK thought that they were not trained adequately in project management and a survey of architectural students in UK indicated they wanted more training in this field (Rogers, 1995). Architects should be aware that this would give them added advantage in ensuring smooth successful project delivery from conception to final handover. Building projects are extremely complex, requiring the skills of many individuals from diverse backgrounds who need to be co-ordinated (harness together as a well-organized team) in

order to achieve clients objectives of undertaking projects. Thus, the interaction of sound professional management systems is essential if the client's goals are to be realized.

Criteria identified under the management group include; pre-design project meetings, assistance in defining project strategy, involvement of other professionals during design stage, co-ordination among phases of the design, co-ordination between design and construction, effective communication of design to contractor, and project review meetings.

2.5 Summary

There were numerous criteria such as cost, time, value, etc, that were identified during literature search, but only seven (7) have been found as the most appropriate and suitable for the research objectives, and are group under four main category headings. These four main category headings are;' ***client focus', 'buildability of design', 'quality of works' and 'management systems'***. These are considered to be the overarching criteria for assessing architects performance on projects that construction clients have engaged them to manage on their behalves. The criteria are listed as shown below under each category set.

Client focus'

1 Understanding clients' corporate objectives

2 Forethought and consideration of users' requirements

3 Identifying and prioritizing project objectives

4 Analyzing the concept and requirements

5 The project was design within budget

6 Completion of design on time

7 Design conformance to client's/owner's requirement

Constructability/Buildability of design'

1 Completion and simplification of design

2 Standardization of elements

3 Dimensional co-ordination of elements

4 Flexibility in design for changes

5 Knowledge of performance characteristics of materials and components

6 Buildability reviews

7 Effective participation in supervision and control

'Quality of works'

1 Aesthetics and quality of design

2 Quality of specification produced

3 Quality of management strategies

4 Production of quality or as built manuals

5 No rework and deficiency in design

6 Design conformance to codes and standards

7 Production of construction inspection and testing programmes

'Management systems'

1 Pre-design project meetings

2 Defining project strategy

3 Involvement of other professional during the design stage

4 Co-ordination among the phases of design

5 Co-ordination between design and construction

6 Effective communication of design to contractor

7 Project review meetings

The above set of 28 criteria identified as listed under each category headings are presented in a conceptual framework below (fig 2.5) for assessing architects performance on building projects.

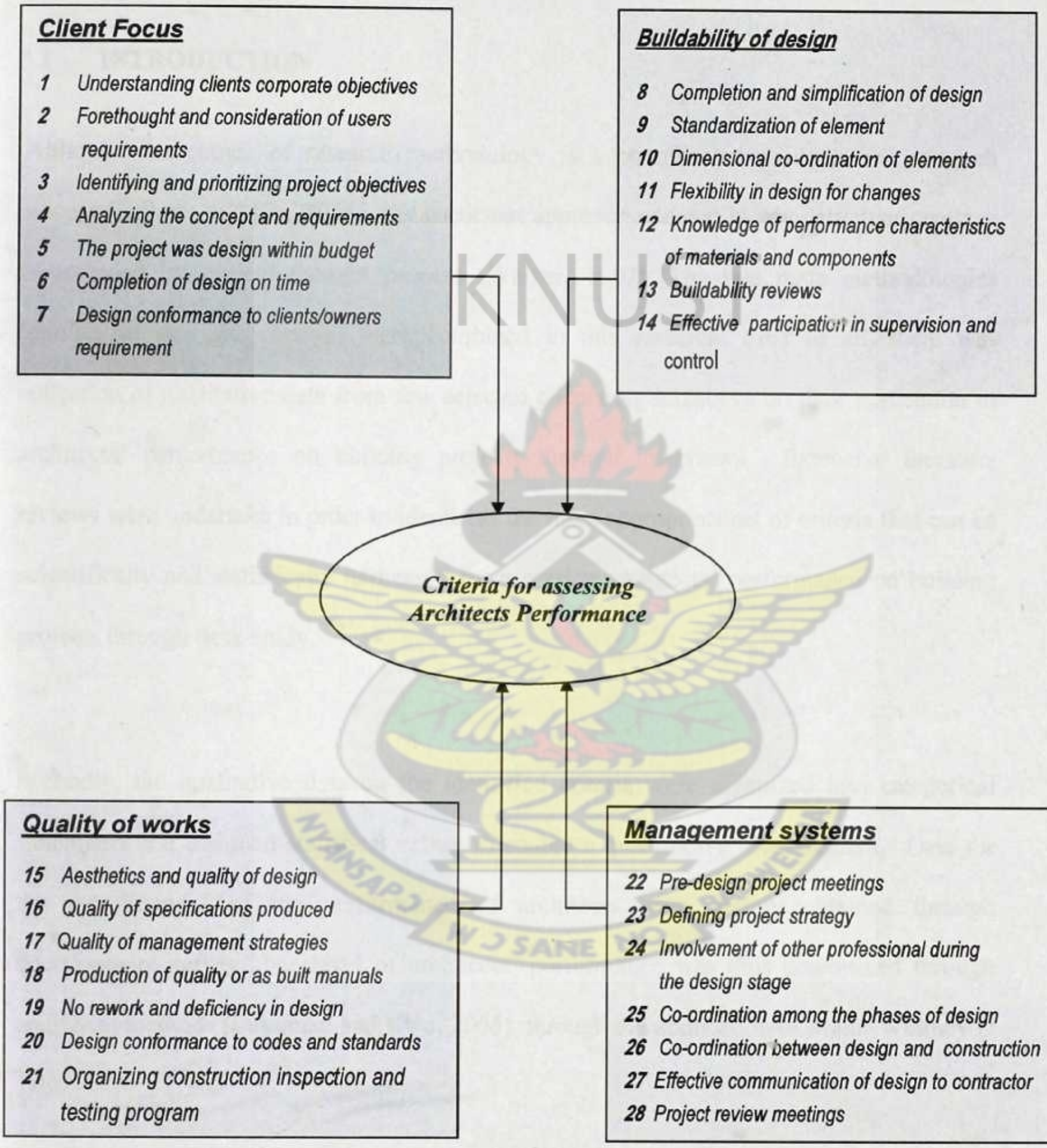

Figure 2.5: *A conceptual framework of criteria for assessing architects' performance*

Source: Conceived from Literature review, (2008).

CHAPTER THREE

RESEARCH METHODS

3.1 INTRODUCTION

Although the choice of research methodology is a complicated stride in the research process (Fellows and Liu, 2006), any particular approach adopted in any particular research is preceded by critical thought process (Walker, 1997). The two main methodologies (*qualitative and quantitative*) were combined in this research. First of all, there was collection of qualitative data from few selected clients organizations on their perception of architects' performance on building projects through interviews. Extensive literature reviews were undertake in order to identified the most appropriate set of criteria that can be scientifically and statistically harnessed for assessing architects' performance on building projects through desk study.

Secondly, the qualitative data on the identified criteria were organized into categorical statements and assigned statistical values to enable a quantitative measurement. Data for the measurement of the performance of architects were mainly obtained through questionnaire survey. The level of architects' performance was thus determined through analytical methods (Lukuman and Kwo, 2005), through the application of Mann-Whitney U Test.

Again, the research methodology presents the procedures employed in achieving the set of objectives for the study. Further discussions were made on all the relevant information or

data that were obtained, and including, how it was collected. Details of the sampling method, questionnaires used for the survey, together with the method(s) employed in analyzing the data are outlined here.

3.2 LITERATURE REVIEW

The research began with an initial investigation into clients' complains about the performance of contract administrators/architects in project delivery in the building industry in Ghana. This was followed by, an extensive literature search on existing information related to clients' perceptions of the performance of consultants/architects in the construction industry. The main source of literature on the performance criteria were obtained from libraries, journals and publications on the internet, and relevant textbooks.

3.2.1 Identification of the performance criteria

Data on the framework of the performance criteria was identified first through personal preliminary survey of clients' opinion on the performance architects within few construction clients' organizations and desk based study. The desk based study was to enable appropriate identification of the criteria that could be suitable for carrying the analysis successfully. This was done after relevant research works have been examined for the purpose of choosing the suitable method. A research into the construction clients'organizations perception on architects' application of project management practices by Pheng and Chuan (2006), in which a *survey questionnaire* was used to study the organizational learning practices of practicing project managers was heavily relied on. Abdul (2008) also used questionnaire survey to compare the practice of value management systems in the Malaysain and the Nigerian construction industry. Lukuman and Kwo (2005) used literature

review only to get data on criteria for examining architects performance in Nigeria building projects

3.3 QUESTIONNAIRE DESIGN

The main instrument used for collection of data on clients' assessment of architects of performance and the measurement of the identified performance criteria was structured survey questionnaire. Walker (1995) used survey questionnaire to investigate construction time performance of projects in which the sample size chosen was based on its ability to conform to the requirements of the statistical method chosen for answering of the research question.

3.3.1 Questionnaire Survey

The research was carried out using a questionnaire survey from the framework of the criteria identified. A questionnaire survey of client organizations from both private and public sectors was undertaken within Accra/Tema and Kumasi Metropolitan areas with respect to a "recently completed building project". Clients from both sectors were asked to assess the importance of each identified criterion (categorical statement) by rating them on a Likert-scale of 1 to 5.

A mixture of "open" and "close" forms of questionnaire were prepared for the survey to seek opinions and facts from professionals in client organizations in public and private sectors of the building industry. The questionnaires were in five (5) parts; Parts 1&2 were to collect general information about the respondents, their organizations and the projects undertaken. Parts 3 & 4 contained details of series of criteria identified during the literature

review for respondents to rate for importance/assessment by indicating (ticking) in their corresponding boxes on the scale from one to five. Part 5, allow the respondents to comment generally on their perceptions of architects' performance in successful building projects delivery in Ghana.

3.4 SAMPLE SELECTION

The purpose of the sampling was to get information about the population by observing a proportion of that population. According to Fellows and Liu (2006), three random sampling conditions should be maintained during the sampling to ensure the selection of a fair representation from client organizations. These conditions are:

- Each organization has the same probability (opportunity) of being selected.
- The sample size reflected the characteristics of the population i.e. each organization selected come from the same population.
- Each organization should be selected independently of any other firm.

The organizations used in the survey are clients in public (All Ministries, Departments, Agencies in Accra, Kumasi and Tema Metropolitan Assemblies) and private (Corporations, Banks, etc.) sectors of the building industry in Ghana, and based in the Accra/Tema (AMA/TMA) and Kumasi (KMA) metropolitan areas. A simple random sampling method was adopted for the client organizations that were surveyed.

Table 3.1 Population of Ministries & MMDAs within AMA/TMA and KMA

	Total
Ministries	**25**
MMDAs	170

Source: www.ghanaweb.com; Surf Publications (2009 Edition).

Table 3.2 Population of Departments and Agencies

	Total
Department and agencies	**40**

Source: www.ghanaweb.com; Surf Publications (2009 Edition).

Table 3.3 Population of Tertiary Institutions

Universities	Total
Public	8
Private	18
Polytechnics	
Public	10
Colleges of Education	38

Source: National Accreditation Board (Oct, 2007).

Table 3.4 Population of Major Health Institutions

Teaching Hospitals	Total
Public	3
Private	-
General Hospital & Polyclinics	
Public	10
Private	7

Source: Ghana Health Services (Feb, 2009).

Table 3.5 Population of Licensed Banks

	Total
Central Bank	1
Universal & offshore Banks	1
Universal Banks	23
Total	25

Source: Bank of Ghana (Nov, 2008).

Table 3.6 Population of Financial institutions

	Total
Insurance*	20
Loans & Savings	14
Fund management	10

Source: Bank of Ghana (Nov, 2008), NIC* (Sept, 2008).

Table 3.7 Population of Licensed Telecommunication companies

	Total
Telecommunication companies	4

Source: NCA (Dec, 2008).

Table 3.8 Population of Real Estate companies

	Total
Real Estate companies	60

Source: www.ghanaweb.com; Surf Publications (2009 Edition).

Table 3.9: **Population of Public and Private Sector Organizations**

Name	Public	Private
Ministries	25	-
Metropolitan, Municipals, District Assemblies (MMDAs)	3	-
Departments and Agencies	40	-
Tertiary Institutions	18	26
Health Institutions	13	7
Licensed Banks	3	23
Financial institutions	2	74
Telecommunication	1	3
Real Estate	-	60
TOTAL	**143**	**193**
		297

3.4.1 *Sample size*

The total population of client organizations selected within the major urban centres in Ghana is **297**. This is sub-divided into Public and Private Sector with populations of **104** and **193** respectively. The sample sizes of these two sector clients were determined using Kish formula (Kish, 1965) (Equation 3.4) for each sector, thus:-

$$n = \frac{n'}{1 + n'/N} \quad \text{..... (3.4)}$$

Where n = sample size

N = total population

n' = S^2/V^2

V = standard error of sampling distribution (5%)

S^2 = p (1-p)

p = proportion of the population elements that belong to the defined class (65%)

With p = 65% and V = 5%, then

$S^2 = 0.65\ (1- 0.65) = 0.2275$, and

$V^2 = (0.05)^2 = 0.0025$

and hence

$$n' = \frac{0.2275}{0.0025} = 91$$

Now, sample size for **public sector clients** $(n_1) \equiv \frac{n'}{1 + n'/N} = 91/\ (1+ 91/143) = \mathbf{48.53}$

and

sample size for **private sector clients** (n_2) = 91/(1+ 91/193) = **61.84**

Therefore, the total sample size for the public and private sector clients is **111.** The sample distribution is as shown in the Table 3.1 below.

Table 3.1: Distribution of sample size

Type of sectors	Public Sector Clients	Private Sector Clients
Sample Size	**49**	**62**

Now, calculating 95% confidence limit for the proportion of the population elements that belong to the defined class, thus; $1 - \alpha = 0.95 \Rightarrow \alpha = 0.05$ i.e. $Z\alpha_{/2} = 0.025$

Standard error (Se) = 0.05

at 95% confidence limit:

$P \pm Z\alpha_{/2}\, Se = 0.65 \pm 1.96\ (0.05)$

$= 0.65 \pm 0.098$

The 95% confidence interval was from (0.65 – 0.098) to (0.65 + 0.098) = 0.552 to 0.745. Rounding to two (2) decimal places gives 0.55 to 0.75.

This means that there is a 95% probability that the proportion of the population chosen for the study is between 55% to 75% within a total error of 0.098, was reasonable. Therefore, out of the total of 111 (i.e. a minimum of 49 and 62 questionnaires for public and private clients respectively) questionnaires were sent out. According to Melchers (2001), Anderson

and Bushman (2002), a questionnaire survey with 65% response rate can reliably be analyzed. Thus, it was anticipated that a high response rate of at least 70%, can be reasonably assumed.

3.5 QUESTIONNAIRE SURVEY

Most of the questionnaires were distributed by hand to all the selected clients' organizations. A face-to-face interview was carried out as a supplement to the questionnaires that were delivered by hand. Additional clarification was also given to respondents to improve quality of the answers and encourage high response rate. The research was carried out using a questionnaire survey of clients from both public and private sectors of in Ghana. Clients from the two sectors were asked to rate the importance of each of the categorical statements/criteria on a Likert-scale of 1 to 5.

3.6 MEASUREMENT OF PERFORMANCE/ DATA ANALYSIS

Microsoft Excel and SPSS version 16 were the statistical techniques used for the analysis of the questionnaires. Data analysis included comparing similarities and differences using standardized ratio of importance and performance index. Mann-Whitney-Wilcoxon test was also used to determine differences in the mean importance and the mean performance.

The Mann-Whitney U test is a non-parametric test that can be used in place of an unpaired t-test. The Mann-Whitney U Test is used to compare differences between two independent groups when the dependent variable is either ordinal or interval but not normally distributed. However, it is also usually used when the data is ordinal. *A variable is said to be ordinal when its values represent categories with some intrinsic ranking; Examples of ordinal*

variables include attitude scores representing degree of satisfaction or confidence and preference rating scores. For ordinal string variables, the alphabetic order of string values is assumed to reflect the true order of the categories. In general, it is more reliable to use numeric codes (i.e. 1, 2, 3 etc.) to represent ordinal data.

The importance of Mann-Whitney U test lies in its nonparametric nature, which makes it the best alternative to the *independent t-test* and it can be used to compare two samples from the same population. Mann-Whitney U test is not only used to test whether two population means are equal or not, but also, to test the median of two populations. It can be used for both equal and unequal sample sizes. Mann-Whitney U test was developed by Wilcoxon in 1945. Although it is a non-parametric test, it does assume that the two distributions are similar in shape. *Wilcoxon rank sum, Kendall's* and Mann-Whitney U test are similar tests and in the case of ties, Mann-Whitney U test is equivalent to the *chi-square test*.

It is usually used to test the null hypothesis that two samples come from the same population or, alternatively, whether observations in one sample tend to be different or larger than observations in the other. The Mann-Whitney (Mann-Whitney- Wilcoxon or MWW) test can be applied for every field, but most frequently used in Psychology, Medical/Nursing and Business. For example, in Psychology, Mann-Whitney U test is used to compare attitude or behavior, etc. In medicine, Mann-Whitney U test is used to determine the effect of two medicines and whether they are equal or not, and sometimes used in comparing the efficacy of two treatments in clinical trials. In Business, Mann-Whitney U test can be used to determine product preferences of different people in different locations.

3.6.1 Assumptions in Mann-Whitney U test:

Mann-Whitney U text (or Mann-Whitney-Wilcoxon test-MWW) is a non parametric test; hence it does not assume any assumptions related to the distribution. There are, however, some assumptions that are made in order to formulate the null and alternative hypotheses, which authenticate the validity of MWW test. The assumptions are as follows:

- Random samples from one parent population. Mann-Whitney U test assumes that the samples drawn from the same population is random.
- The dependent variable is ordinal, **interval** or **ratio.** In Mann-Whitney U test, Independence within the samples and mutual independence is assumed.
- Samples do **not need to be normally distributed.** Ordinal of scale measurement scale is assumed.

3.6.2 Testing Assumptions

The rating of importance of the criteria were measured on a continuous measurement scale (specifically, an ordinal scale) and thus met the variable requirements for this test. However, having tested the normality of the assessment data of the two clients' types, it was revealed that samples from the two building sector client are not normally distributed. Therefore, the Independent T-Test is not applicable under the circumstance, but rather Mann-Whitney U Test. The procedure for checking the normality of the data is provided within the SPSS software under "Testing for Normality" guide.

3.7 PERFORMANCE ANALYSIS

Fundamentally performance is the measurement of achievement against intention (Rush, 1986). Within the context of this research, performance is represented as the ratio of the level of achievement to the corresponding level of importance of any performance criteria that was identified:

$$\text{Performance (P)} = \frac{\text{Achievement (Achi)}}{\text{Importance (Imp)}} \qquad (3.1)$$

$$\text{Average Performance [Av. Perf]} \ (\mu_p) = \frac{\sum_{i=1}^{N} Pi}{N} = \frac{\sum_{i=1}^{N} \left(\frac{Ai}{Ii}\right)}{N} \qquad (3.2)$$

$$\text{Index} = \frac{\text{Mean}}{\textit{Standard Deviation}} \qquad (3.3)$$

From Equation (3.1) above, for any particular criterion, any value above "one" means that achievement is greater than importance indicating that the architect has "over-performed relative to importance of criterion that was rated". Values of "one" indicates that "optimum" performance has been achieved, while a value below one indicates that the architect has "under-performed".

This highlights a need for some level of improvement in this aspect. Therefore, the average performance (Av. Perf.) of a criterion, which is the arithmetic mean of all performance evaluated by the respondents on that criterion will be chosen. This can be represented mathematically, as shown in *Equation (3.2)* above.

Where μ_p is the performance arithmetic mean on a particular criterion; i=1, 2, 3…N and N is the number of respondents of that criterion. However, there are situations where the mean may not fully represent the data if the data has high standard deviations, as noted by Pongpeng and Liston (2003). Therefore, in order to surmount this phenomenon, Lehmann (1989) has recommended that a standardized ratio should be used instead. Pongpeng and Liston (2003) have used this standard successfully in evaluating contractor's ability in Thailand. This same concept as shown in *Equation 3.3* is used to rank the *importance*, *achievement* and *performance* of each criterion. This leads to the formulation of importance index (Imp Index), achievement index (Achi Index) and performance index (Perf Index).

It should be noted that the standardized ratio as mentioned in the preceding paragraph is also used in the theory of structural reliability, where reliability index is the ratio of mean to standard deviation (Ang and Tang, 1984; Melchers, 2001). Any reliability index above three (3) is said to be good, four (4) is very good and five (5) is excellent. Thus for any performance index of a criterion above three, it means the architect's performance is satisfactory for that criterion.

3.8 DATA ANALYSIS AND DISCUSSIONS

The data were analyzed as follows:

- Comparison of standardized ratio of performance indexes in both private and public sector building projects.

- To find similarities and differences between the mean importance and, mean performance of public and private sectors building projects using Mann Whitney U Test or Wilcoxon Rank-Sum tests. Mann Whitney U Test is a non-parametric test that is useful for determining if the mean of two groups or sample are different from each other. The Mann Whitney U Test was done through a hypothesis testing.

3.8.1 Hypothesis Testing

The desire of this test is to examine whether, or if there are similarities or differences between the *mean importance and mean performance* of the identified criteria for public and private sector clients. The hypotheses for the two means are tested at 5 per cent significance level, and as shown mathematically below;

H_o: $\mu_{i1} = U_{i2}$ (The mean importance of the criteria rated for public and private clients are not the same)

H_1: $\mu_{i1} \neq U_{i2}$ (The mean importance of the criteria rated for public and private clients are the same)

H_o: $\mu_{A1} = U_{A2}$ (Public and Private Clients mean assessment of the architects performance are not the same)

H_1: $\mu_{A1} \neq U_{A2}$ (Public and Private Clients mean assessment of the architects performance are not the same)

Using the Z - values:

- If the observed Z-values do not equal or exceed the critical Z-value of 1.96 (i.e. p <= 0.05, .i.e. critical Z- value for two-tailed test), then it can be assumed that null hypothesis is correct, and there is no significance difference the two sectors.

- If the Z-values, however, exceed 1.96 then, there is evidence to reject the null hypothesis. The result is shown in tables 4.6 and 4.7 under ***section 4.4-Discussions.***

CHAPTER FOUR

4.0 DATA COLLECTION, ANALYSIS AND DISCUSSIONS

4.1 INTRODUCTION

This chapter is essentially devoted to the analysis of data collected and the comments on the findings. The first part deals with descriptive analysis of the demographics of the respondents. The second part of the analysis deals with the respondents' or clients' perception of architects' performance in the building sector of the construction industry based on Likert scale of rating. The third and final part deals with the Mann-Whitney U test analysis on the two independent samples of clients.

4.2 PRESENTATION OF RESPONSE TO DATA COLLECTION

The empirical bases for this research is pivoted on questionnaire survey and direct interviews administered to construction clients randomly chosen from the construction industry within Accra/Tema and Kumasi Metropolis. The respondents are private individuals, corporate organizations and pubic establishments to assess the level of their satisfaction with respect to the performance of construction professionals (*particularly, architects, who are seen as leaders of the design team*) operating in Ghana. Personal follow-ups and phone calls led to a total number of 95 of the questionnaires received out of the 120 administered within the three Metropolis. The remaining 25 questionnaires sent out were not answered or unresponsive, despite the numerous follow-up communications.

The 120 experienced clients surveyed comprised of 68 public and 52 private sector clients. The public clients included state Ministries, Departments, Agencies, Institutions (Tertiary, Judiciary and Hospitals), and Corporations that are involved in housing or building infrastructure development. The respondents for the private sector building projects were mostly Estate developers and Investors (Mortgage, Fund management and Financial institutions), and few individuals. For the developers, the questionnaires were sent to the managing directors while for the estate developers and investors they were sent to the Project Directors or Technical Directors. The questionnaires were delivered to the respondents by hand, followed by an interview for those willing to cooperate. During the interview the researcher had the opportunity to clarify some ambiguities the respondents have encountered.

The **95** complete responses obtained representing a cumulative percentage of 79% of the total questionnaires sent is broken down as follows; 55 responsive public clients (representing **46.83** percent) and 40 responsive private clients (representing **33.33** percent). This was considered adequate for analysis based on the assertion by Moser and Kalton (1971) that, a survey results could be considered as biased and of little importance if the return rate was lower than 30-40 per cent. Also, Babie (1989) suggests that any rate over 50 per cent can be reported, over 60 per cent is good and 70 per cent is excellent and representative enough for further statistical analysis. The analysis of the responses is as shown in Table 4.1. The spread of responses from the two groups of respondents is also shown in Table 4.1 and Figure 4.1, respectively.

Table 4.1: *Survey Response Levels*

Respondents	Issued	Returned	Not returned	Percentage Returned
Public Clients	68	55	13	**45.83**
Private Clients	52	40	12	**33.33**
Total	**120**	**95**	**25**	**79.16**

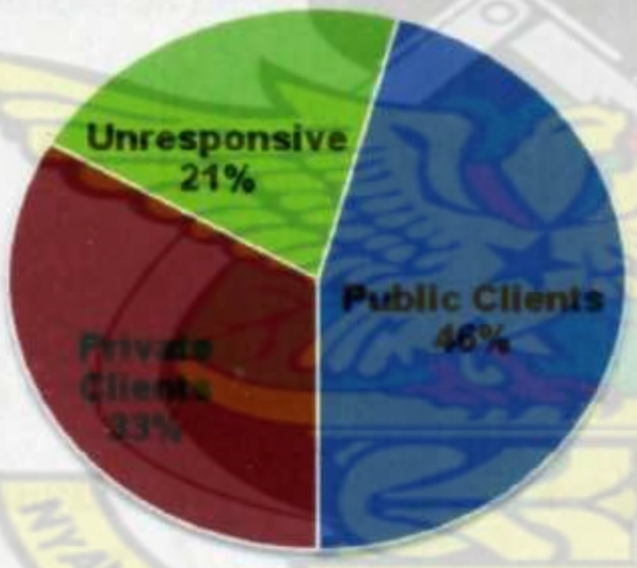

Figure 4.1: Survey Response Levels

A total of 44.83 percent of the projects from the survey were *office blocks*, followed by 20.69 percent for *school*, with 19.54 per cent representing other projects types, such as shops, stalls, filling stations etc. Residential facilities also account for 10.34 percent of the projects undertaken by clients. These four (4) project types accounted for 95 percent of the total projects undertaken by both clients during the survey. Figure 4.2 shows the various

projects that both clients have undertaken. This has also shown the type buildings that clients' are interested in.

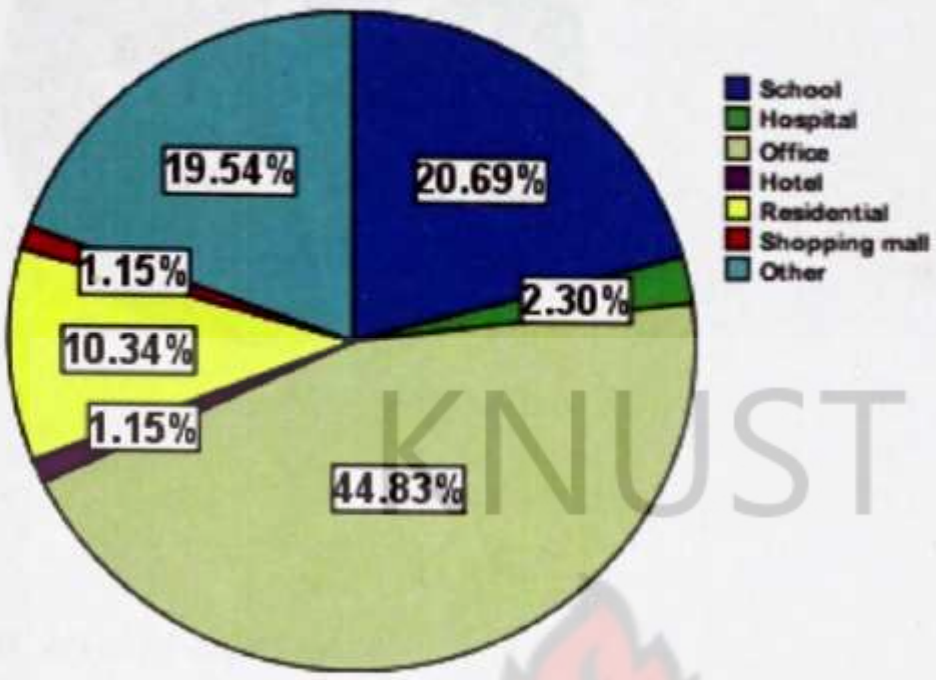

Figure 4.2: *Types of construction projects undertaken by clients*

Public sector clients have at least 20 years of experience in the building construction industry. On the whole, a little over half of the clients sampled have a minimum of 20years experience in the construction industry. On the average, these clients had handled cumulatively, over 30 projects within the period of 2004 to 2008. The average years of experience for the private sector clients were 10 years, and they have handled more than 15 projects up to the year under review. Figure 4.3 shows the years of experience of clients in the building construction sector.

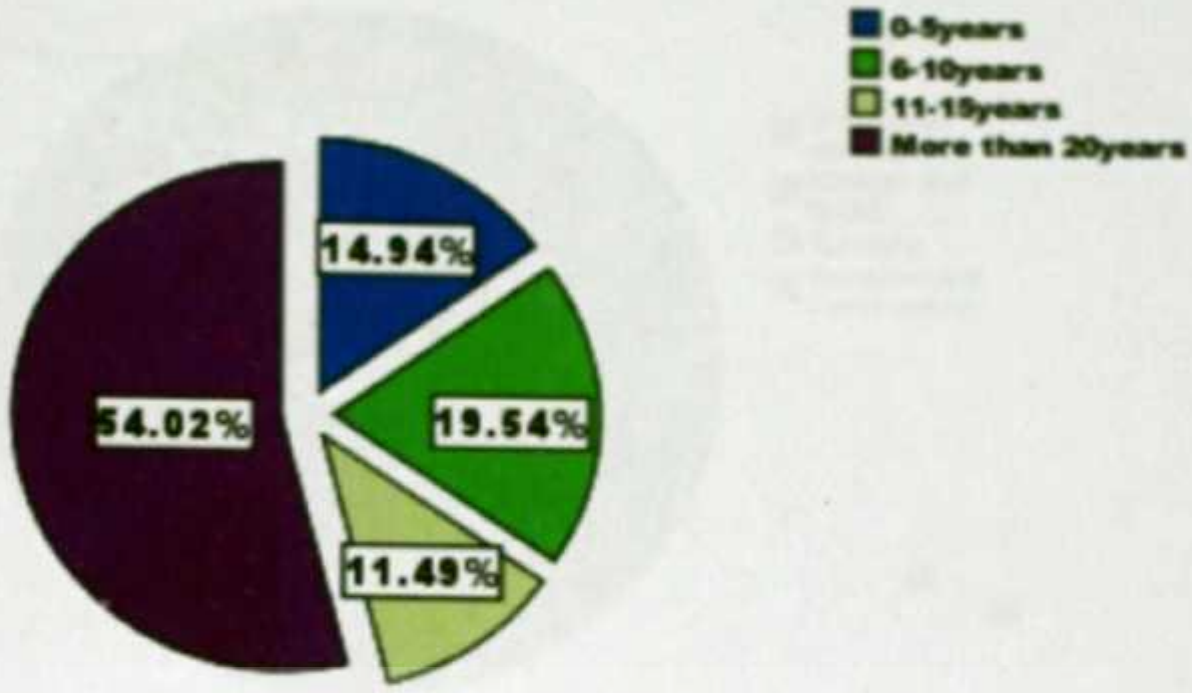

Figure 4.3: *Clients' level of experience*

The survey has revealed that most of the clients in the Ghanaian building construction industry favours the Traditional procurement to other forms of procurement systems. Data gathered from the survey has shown that this type of procurement arrangement has accounted for 87.36 percent of all the contracts that were awarded or let out during the years under review. It is worth noting here that architects were mostly the lead consultants for these contracts awarded. Other procurement types such as Design and build, Management contracting and Turnkey do not have much impact on the building construction landscape of Ghana. They have only 12.64 percent of all the contracts that were let out. A possible reason may be that the Ghanaian building sector clients are more familiar with the Traditional procurement system. The types of procurement arrangement adopted by building construction clients are represented in Figure 4.4 below.

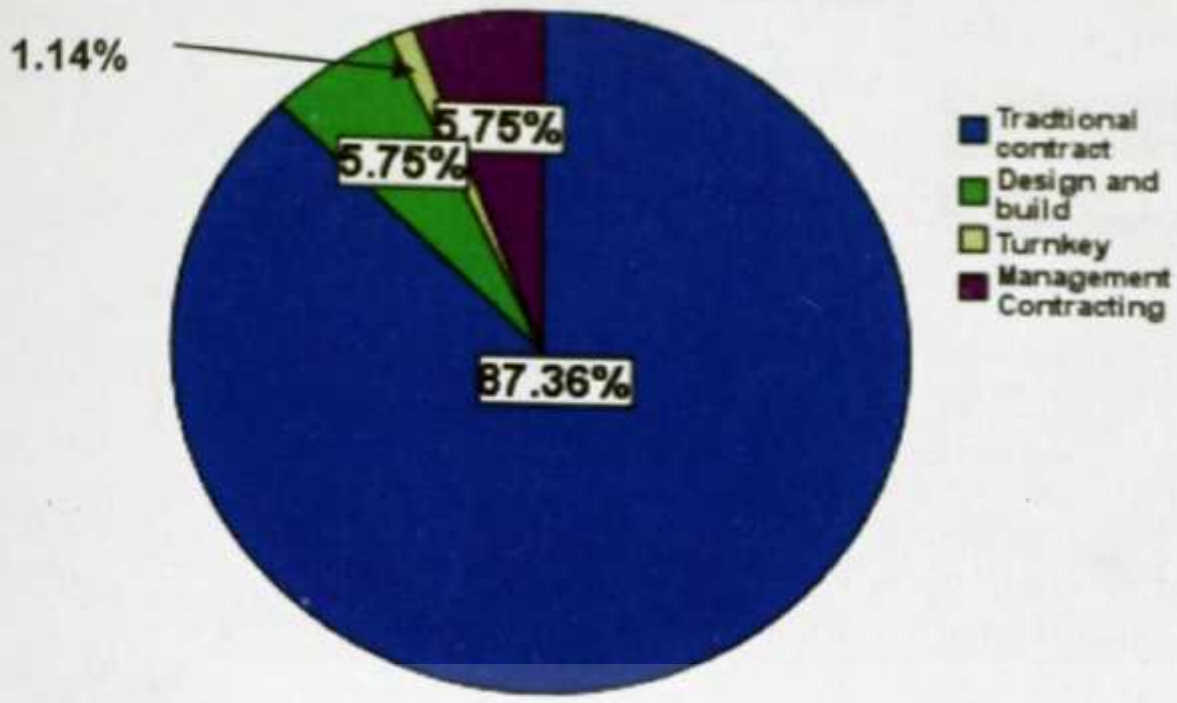

Figure 4.4: *Types of procurement arrangement being adopted by clients*

It came to light during the survey that most (**82.76** percent) of the projects that clients undertook have suffered one form of setback of overran. The setbacks were either of cost, time or both. About a quarter (26.44 percent) of the projects have suffered severe cost overran, and 26.74 percent of the projects were completed far beyond the stipulated contract periods. Some of the projects also experienced both cost and time overruns (44.83 percent). This is presented in Figures 4.5 (a) and (b) below.

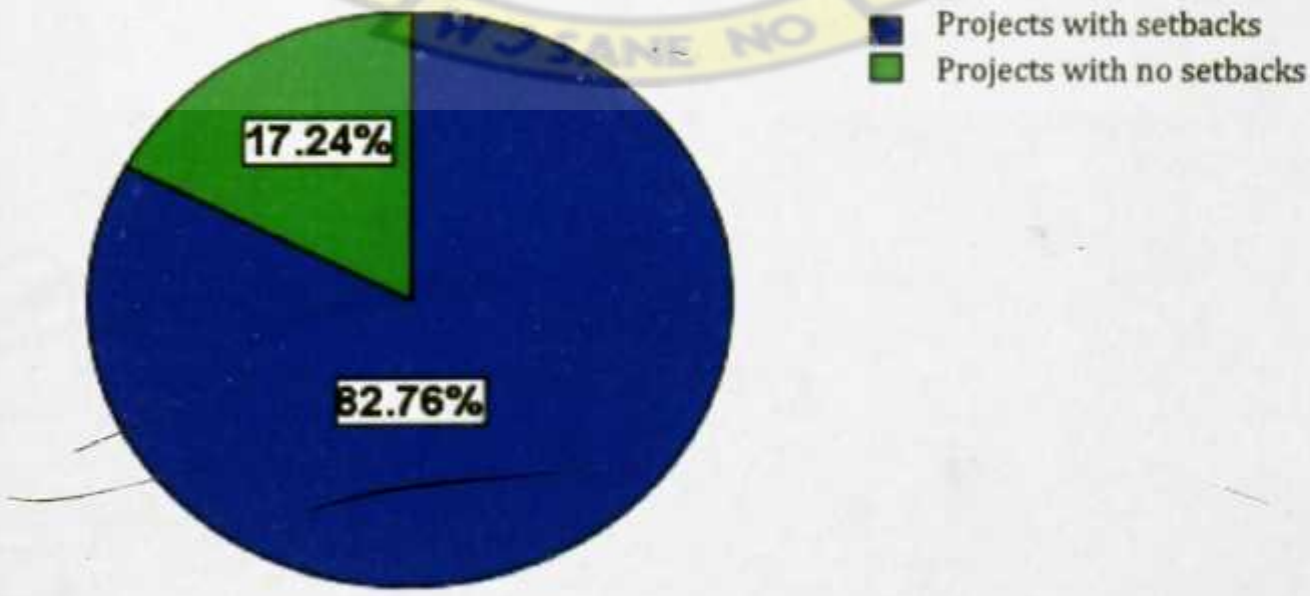

Figure 4.5 (a): *Proportion of clients' projects that suffered setbacks*

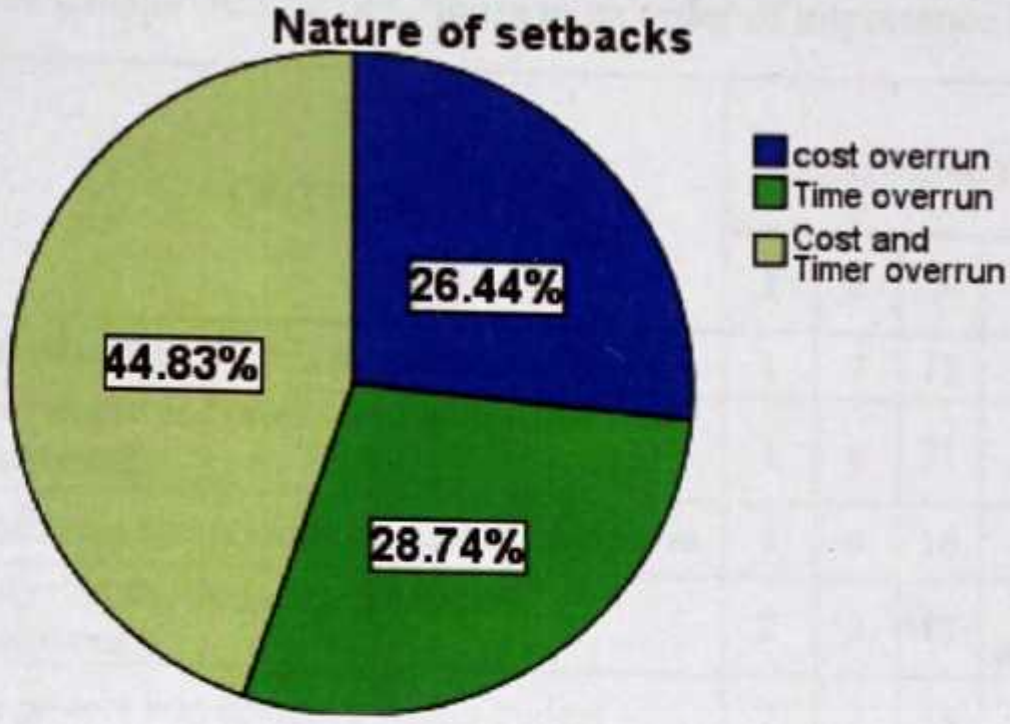

Figure 4.5 (b): *Proportion of the types of setbacks that the projects suffered*

4.2.1 Clients Rating of Criteria of Importance

During the survey, the clients (both public and private) were requested to rate the criteria in an order of importance in accordance with the likert scale. The data gathered are presented in Tables 4.2 (a) and 4.3 (a) below for public and private clients respectively .

Table 4.2(a): Public Clients' Rating of Criteria in an order of importance (Part 3)

CATEGORY /GROUP	CRITERIA	FREQUENCY OF IMPORTANCE					
		1	2	3	4	5	TOTAL (N)
Client Focus	Understanding client's corporate objectives	1	7	13	19	15	55
	Forethought and consideration of users' requirements	1	6	21	15	12	55
	Identifying and prioritizing project objectives	3	4	16	24	8	55
	Analyzing the design concepts and requirements	2	3	17	18	15	55
	The project was designed within budget	2	2	19	23	9	55
	Completion of design on time	1	0	18	24	12	55
	Design conformance to owner's requirement	1	8	16	19	11	55
Buildability of design	Completion and simplification of design	3	10	15	19	8	55
	Standardization of elements	1	3	19	24	8	55
	Dimensional co-ordination of elements	2	8	15	22	8	55
	Flexibility of design for changes	2	8	17	23	5	55
	Knowledge of performance characteristics of materials and components	4	7	22	18	4	55
	Buildability reviews	3	8	19	21	4	55
	Effective participation in supervision and control	1	4	25	20	5	55
Quality of Works	Aesthetic and quality of design	3	5	16	17	14	55
	Quality of specification produced	3	4	11	25	12	55
	Quality of management strategies	0	8	14	24	9	55
	Production of quality or as-built manuals	7	5	14	21	8	55
	No rework and deficiency in design	3	14	16	17	5	55
	Design conformance to codes and standards	2	8	17	18	10	55
	Organizing construction inspection and testing program	1	3	18	25	8	55
Management systems	Pre-design project meetings	0	14	16	15	10	55
	Assist in defining project strategy	4	8	15	19	9	55
	Involvement of other professionals at the design stage	2	0	16	23	14	55
	Co-ordination among phases of design	1	4	11	23	16	55
	Co-ordination between design and construction	0	2	16	24	13	55
	Effective communication of design to contractor	0	6	13	28	8	55
	Project review meetings	4	4	19	18	10	55

Table 4.2(b): Private Clients' Rating of Criteria in an order importance (Part 3)

Client Focus	Understanding client's corporate objectives	2	8	13	13	4	40
	Forethought and consideration of users' requirements	0	3	15	17	5	40
	Identifying and prioritizing project objectives	2	5	10	13	10	40
	Analyzing the design concepts and requirements	0	6	12	6	16	40
	The project was designed within budget	2	6	14	15	3	40
	Completion of design on time	0	3	16	13	8	40
	Design conformance to owner's requirement	1	5	12	13	9	40
Buildability of design	Completion and simplification of design	0	4	11	16	9	40
	Standardization of elements	2	3	12	18	5	40
	Dimensional co-ordination of elements	0	3	15	13	9	40
	Flexibility of design for changes	0	4	12	16	8	40
	Knowledge of performance characteristics of materials and components	0	2	14	10	14	40
	Buildability reviews	0	3	7	22	8	40
	Effective participation in supervision and control	3	0	15	13	9	40
Quality of Works	Aesthetic and quality of design	1	3	12	16	8	40
	Quality of specification produced	2	5	12	15	6	40
	Quality of management strategies	0	5	11	12	12	40
	Production of quality or as-built manuals	6	3	9	15	7	40
	No rework and deficiency in design	4	0	16	14	6	40
	Design conformance to codes and standards	2	1	14	12	11	40
	Organizing construction inspection and testing program	5	4	8	12	11	40
Management systems	Pre-design project meetings	2	3	13	15	7	40
	Assist in defining project strategy	1	4	12	11	12	40
	Involvement of other professionals at the design stage	1	3	15	16	5	40
	Co-ordination among phases of design	3	4	12	9	12	40
	Co-ordination between design and construction	1	3	10	10	16	40
	Effective communication of design to contractor	0	5	12	15	8	40
	Project review meetings	1	6	14	15	4	40

4.2.2 Clients Assessment of Architects' Achievement

The two clients types were also asked to assess the achievement of architects they had engaged based on the same criteria. The data gathered are presented in Tables 4.3 (a) and 4.3 (b) below. The performance of architects for the private and public sectors are summarized in Tables 4.5a and 4.5b respectively

Table 4.3(a) : Public Clients' Assessment of Architects' Level of Achievement(Part 4)

CATEGORY /GROUP	CRITERIA	FREQUENCY OF PERFORMANCE RATING					
		1	2	3	4	5	TOTAL (N)
Client Focus	Understanding client's corporate objectives	4	9	16	15	11	55
	Forethought and consideration of users' requirements	5	8	17	16	9	55
	Identifying and prioritizing project objectives	1	5	22	23	4	55
	Analyzing the design concepts and requirements	6	2	23	19	5	55
	The project was designed within budget	4	2	26	15	8	55
	Completion of design on time	8	8	16	13	10	55
	Design conformance to owner's requirement	6	9	16	17	7	55
Buildability of design	Completion and simplification of design	5	7	18	20	5	55
	Standardization of elements	2	3	29	15	6	55
	Dimensional co-ordination of elements	5	12	18	17	3	55
	Flexibility of design for changes	5	10	21	14	5	55
	Knowledge of performance characteristics of materials and components	4	4	28	15	4	55
	Buildability reviews	2	12	22	14	5	55
	Effective participation in supervision and control	4	4	26	18	3	55
Quality of Works	Aesthetic and quality of design	4	6	15	20	10	55
	Quality of specification produced	2	7	20	17	9	55
	Quality of management strategies	3	11	18	18	5	55
	Production of quality or as-built manuals	2	12	21	16	4	55
	No rework and deficiency in design	5	14	17	16	3	55
	Design conformance to codes and standards	4	8	20	17	6	55
	Organizing construction inspection and testing program	2	4	19	25	5	55
Management systems	Pre-design project meetings	4	16	15	14	6	55
	Assist in defining project strategy	5	12	17	12	9	55
	Involvement of other professionals at the design stage	4	7	12	24	8	55
	Co-ordination among phases of design	2	5	21	18	9	55
	Co-ordination between design and construction	3	6	19	22	5	55
	Effective communication of design to contractor	2	4	16	27	6	55
	Project review meetings	4	3	22	18	8	55

Table 4.3(b) : Private Clients' Assessment of Architects' Level of Achievement(Part 4)

CATEGORY /GROUP	PERFORMANCE CRITERIA	FREQUENCY OF PERFORMANCE RATING					
		1	2	3	4	5	TOTAL (N)
Client Focus	Understanding client's corporate objectives	1	3	19	12	5	40
	Forethought and consideration of users' requirements	0	7	13	17	3	40
	Identifying and prioritizing project objectives	4	7	10	11	8	40
	Analyzing the design concepts and requirements	2	4	17	13	4	40
	The project was designed within budget	1	14	14	9	2	40
	Completion of design on time	0	3	18	15	4	40
	Design conformance to owner's requirement	4	4	12	8	12	40
Buildability of design	Completion and simplification of design	4	5	18	10	3	40
	Standardization of elements	1	7	20	9	3	40
	Dimensional co-ordination of elements	2	5	16	15	2	40
	Flexibility of design for changes	4	5	12	13	6	40
	Knowledge of performance characteristics of materials and components	5	3	15	11	6	40
	Buildability reviews	2	14	16	6	2	40
	Effective participation in supervision and control	0	20	9	5	6	40
Quality of Works	Aesthetic and quality of design	4	3	14	10	9	40
	Quality of specification produced	0	8	17	12	3	40
	Quality of management strategies	5	4	14	9	8	40
	Production of quality or as-built manuals	2	10	18	7	3	40
	No rework and deficiency in design	3	11	14	9	3	40
	Design conformance to codes and standards	4	5	16	12	3	40
	Organizing construction inspection and testing program	3	4	11	14	8	40
Management systems	Pre-design project meetings	0	4	14	12	10	40
	Assist in defining project strategy	0	6	18	10	6	40
	Involvement of other professionals at the design stage	4	2	17	14	3	40
	Co-ordination among phases of design	5	5	17	9	4	40
	Co-ordination between design and construction	2	9	11	12	6	40
	Effective communication of design to contractor	0	6	12	20	2	40
	Project review meetings	2	5	18	10	5	40

Table 4.4(a): Public clients' Assessment of Architects' Performance

PERFORMANCE CRITERIA	IMPORTANCE CRITERIA RATING						ACHIEVEMENTCRITERIA RATING						PERF (A/I)				
	1	2	3	4	5	TOTAL	1	2	3	4	5	TOTAL	1	2	3	4	5
Understanding client's corporate objectives	1	7	13	19	15	55	4	9	16	15	11	55		1.29	1.23	0.79	0.73
Forethought and consideration of users' requirements	1	6	21	15	12	55	5	8	17	16	9	55		1.33	0.81	1.07	0.75
Identifying and prioritizing project objectives	3	4	16	24	8	55	1	5	22	23	4	55		1.25	1.38	0.96	0.50
Analyzing the design concepts and requirements	2	3	17	18	15	55	6	2	23	19	5	55		0.67	1.35	1.06	0.33
The project was designed within budget	2	2	19	23	9	55	4	2	26	15	8	55		1.00	1.37	0.65	0.89
Completion of design on time	1		18	24	12	55	8	8	16	13	10	55			0.89	0.54	0.83
Design conformance to owner's requirement	1	8	16	19	11	55	6	9	16	17	7	55			1.00	0.89	0.64
Completion and simplification of design	3	10	15	19	8	55	5	7	18	20	5	55		0.70	1.20	1.05	0.63
Standardization elements	1	3	19	24	8	55	2	3	29	15	6	55			1.53	0.63	0.75
Dimensional co-ordination of elements	2	8	15	22	8	55	5	12	18	17	3	55		1.50	1.20	0.77	0.38
Flexibility of design for changes	2	8	17	23	5	55	5	10	21	14	5	55	2.50	1.25	1.24	0.61	1.00
Knowledge of performance characteristics of materials and components	4	7	22	18	4	55	4	4	28	15	4	55		0.57	1.27	0.83	1.00
Buildability reviews	3	8	19	21	4	55	2	12	22	14	5	55	0.67	1.50	1.16	0.67	1.25

Table 4.4(a): Public clients' Assessment of Architects' Performance **cont'd**

Effective participation in supervision and control	1	4	25	20	5	55	4	4	26	18	3	55		1.00	1.04	0.90	0.60
Aesthetic and quality of design	3	5	16	17	14	55	4	6	15	20	10	55		1.20	0.94	1.18	0.71
Quality of specification produced	3	4	11	25	12	55	2	7	20	17	9	55	0.67	1.75	1.82	0.68	0.75
Quality of management strategies		8	14	24	9	55	3	11	18	18	5	55		1.38	1.29	0.75	0.56
Production of quality or as-built manuals	7	5	14	21	8	55	2	12	21	16	4	55	0.29	2.40	1.50	0.76	0.50
No rework and deficiency in design	3	14	16	17	5	55	5	14	17	16	3	55		1.00	1.06	0.94	0.60
Design conformance to codes and standards	2	8	17	18	10	55	4	8	20	17	6	55		1.00	1.18	0.94	0.60
Organizing construction inspection and testing program	1	3	18	25	8	55	2	4	19	25	5	55		1.33	1.06	1.00	0.63
Pre-design project meetings		14	16	15	10	55	4	16	15	14	6	55		1.14	0.94	0.93	0.60
Defining project strategy	4	8	15	19	9	55	5	12	17	12	9	55	1.25	1.50	1.13	0.63	1.00
Involvement of other professionals at the design stage	2		16	23	14	55	4	7	12	24	8	55			0.75	1.04	0.57
Co-ordination among phases of design	1	4	11	23	16	55	2	5	21	18	9	55		1.25	1.91	0.78	0.56
Co-ordination between design and construction		2	16	24	13	55	3	6	19	22	5	55		3.00	1.19	0.92	0.38
Effective communication of design to contractor		6	13	28	8	55	2	4	16	27	6	55		0.67	1.23	0.96	0.75
Project review meetings	4	4	19	18	10	55	4	3	22	18	8	55		0.75	1.16	1.00	0.80

Table 4.4(b): Private clients' Assessment of Architects' Performance

PERFORMANCE CRITERIA	IMPORTANCE CRITERIA RATING						ACHIEVEMENT CRITERIA RATING						PERF (A/I)				
	1	2	3	4	5	TOTAL	1	2	3	4	5	TOTAL	1	2	3	4	5
Understanding client's corporate objectives	2	8	13	13	4	40	1	3	19	12	5	40	0.50	0.38	1.46	0.92	1.25
Forethought and consideration of users' requirements		3	15	17	5	40		7	13	17	3	40			0.87	1.00	0.60
Identifying and prioritizing project objectives	2	5	10	13	10	40	4	7	10	11	8	40		1.40	1.00	0.85	0.80
Analyzing the design concepts and requirements		6	12	6	16	40	2	4	17	13	4	40		0.67	1.42	2.17	0.25
The project was designed within budget	2	6	14	15	3	40	1	14	14	9	2	40			1.00	0.60	0.67
Completion of design on time		3	16	13	8	40		3	18	15	4	40			1.13	1.15	0.50
Design conformance to owner's requirement	1	5	12	13	9	40	4	4	12	8	12	40		0.80	1.00	0.62	1.33
Completion and simplification of design		4	11	16	9	40	4	5	18	10	3	40			1.64	0.63	0.33
Standardization elements	2	3	12	18	5	40	1	7	20	9	3	40		2.33	1.67	0.50	0.60
Dimensional co-ordination of elements		3	15	13	9	40	2	5	16	15	2	40		1.67	1.07	1.15	0.22
Flexibility of design for changes		4	12	16	8	40	4	5	12	13	6	40		1.25	1.00	0.81	0.75
Knowledge of performance characteristics of materials and components		2	14	10	14	40	5	3	15	11	6	40		1.50	1.07	1.10	0.43
Buildability reviews		3	7	22	8	40	2	14	16	6	2	40		4.67	2.29	0.27	0.25
Effective participation in supervision and control	3		15	13	9	40		20	9	5	6	40			0.60	0.38	0.67
Aesthetic and quality of design	1	3	12	16	8	40	4	3	14	10	9	40		1.00	1.17	0.63	1.13

Table 4.4(b): Private clients' Assessment of Architects' Performance **cont'd**

Quality of specification produced	2	5	12	15	6	40		8	17	12	3	40		1.60	1.42	0.80	0.50
Quality of management strategies		5	11	12	12	40	5	4	14	9	8	40		0.80	1.27	0.75	0.67
Production of quality or as-built manuals	6	3	9	15	7	40	2	10	18	7	3	40	0.33	3.33	2.00	0.47	0.43
No rework and deficiency in design	4		16	14	6	40	3	11	14	9	3	40			0.88	0.64	0.50
Design conformance to codes and standards	2	1	14	12	11	40	4	5	16	12	3	40	2.00		1.14	1.00	0.27
Organizing construction inspection and testing program	5	4	8	12	11	40	3	4	11	14	8	40		1.00	1.38	1.17	0.73
Pre-design project meetings	2	3	13	15	7	40		4	14	12	10	40		1.33	1.08	0.80	1.43
Defining project strategy	1	4	12	11	12	40		6	18	10	6	40	0.00	1.50	1.50	0.91	0.50
Involvement of other professionals at the design stage	1	3	15	16	5	40	4	2	17	14	3	40			1.13	0.88	0.60
Co-ordination among phases of design	3	4	12	9	12	40	5	5	17	9	4	40		1.25	1.42	1.00	0.33
Co-ordination between design and construction	1	3	10	10	16	40	2	9	11	12	6	40		3.00	1.10	1.20	0.38
Effective communication of design to contractor		5	12	15	8	40		6	12	20	2	40		1.20	1.00	1.33	0.25
Project review meetings	1	6	14	15	4	40	2	5	18	10	5	40		0.83	1.29	0.67	1.25

Table 4.5(a) : Summary of Public Sector Clients' Assessment of Architects' Performance

PERFORMANCE CRITERIA	Importance				Achievement				Av perf (μp)	Perf std dev	Perf index	Overall Perf Ranking
	Av imp	Imp std dev	Imp index	Imp rank	Av achi	Achi std dev	Achi index	Achi rank				
Understanding client's corporate objectives	3.90	0.94	4.13	**19**	3.55	1.03	3.46	**19**	1.21	0.57	**2.13**	**15**
Forethought and consideration of users' requirements	3.80	0.85	4.49	**9**	3.70	0.85	4.34	**6**	0.93	0.24	**3.80**	**4**
Identifying and prioritizing project objectives	3.73	0.85	4.39	**12**	3.57	0.70	5.10	**1**	0.88	0.38	**2.28**	**13**
Analyzing the design concepts and requirements	3.75	0.87	4.29	**15**	3.45	0.88	3.93	**14**	0.94	0.42	**2.25**	**14**
The project was designed within budget	3.69	0.81	4.56	**8**	3.47	0.86	4.06	**10**	1.04	0.30	**3.47**	**5**
Completion of design on time	3.82	0.83	4.61	**7**	3.14	1.02	3.07	**26**	0.77	0.20	**3.86**	**3**
Design conformance to owner's requirement	4.04	0.82	4.90	**2**	3.45	1.08	3.21	**23**	0.84	0.44	**1.88**	**19**
Completion and simplification of design	3.47	0.75	4.65	**5**	3.41	0.75	4.53	**2**	0.91	0.29	**3.15**	**10**
Standardization of elements	3.69	0.83	4.44	**11**	3.31	0.76	4.35	**5**	0.84	0.61	**1.39**	**26**
Dimensional co-ordination of elements	3.51	0.90	3.89	**23**	3.08	0.98	3.15	**24**	0.92	0.47	**1.98**	**17**
Flexibility of design for changes	3.29	0.78	4.24	**17**	3.06	1.07	2.87	**28**	1.34	0.71	**1.90**	**18**
Knowledge of performance characteristics of materials and components	3.49	0.80	4.36	**14**	3.37	0.87	3.90	**15**	0.92	0.29	**3.12**	**11**
Buildability reviews	3.80	0.80	4.78	**4**	3.61	1.06	3.40	**20**	0.89	0.21	**4.22**	**2**
Effective participation in supervision and control	3.51	0.85	4.14	**18**	3.37	0.77	4.36	**4**	1.05	0.32	**3.23**	**8**

Table 4.5(a): Summary of Public Sector Clients' Assessment of Architects' Performance **cont'd**

Aesthetic and quality of design	3.37	0.94	3.60	**25**	3.00	1.00	3.00	**27**	1.24	0.79	**1.58**	**24**
Quality of specification produced	3.84	0.99	3.89	**22**	3.51	0.95	3.71	**17**	0.87	0.65	**1.35**	**27**
Quality of management strategies	3.73	0.87	4.26	**16**	3.22	0.92	3.48	**18**	1.17	0.81	**1.44**	**25**
Production of quality or as-built manuals	3.27	1.01	3.25	**27**	3.12	0.83	3.74	**16**	1.03	0.80	**1.28**	**28**
No rework and deficiency in design	3.45	1.08	3.19	**28**	3.08	0.91	3.37	**22**	0.95	0.52	**1.85**	**20**
Design conformance to codes and standards	3.63	1.04	3.48	**26**	3.51	0.82	4.31	**7**	0.88	0.44	**2.01**	**16**
Organizing construction inspection and testing program	3.73	0.80	4.65	**6**	3.65	0.90	4.06	**9**	0.88	0.28	**3.17**	**9**
Pre-design project meetings	3.92	0.88	4.48	**10**	3.04	0.76	4.03	**11**	0.92	0.28	**3.31**	**7**
Assist in defining project strategy	3.41	0.87	3.94	**20**	3.41	0.80	4.24	**8**	0.81	0.50	**1.61**	**23**
Involvement of other professionals design at stage	4.00	0.83	4.80	**3**	3.65	0.91	3.99	**12**	0.82	0.24	**3.47**	**6**
Co-ordination among phases of design	4.06	1.06	3.82	**24**	3.61	1.17	3.09	**25**	1.06	0.59	**1.80**	**21**
Co-ordination between design and construction	3.90	0.89	4.38	**13**	3.39	0.85	3.99	**13**	0.79	0.47	**1.69**	**22**
Effective communication of design to contractor	3.71	0.94	3.93	**21**	3.53	0.81	4.36	**3**	0.92	0.31	**3.02**	**12**
Project review meetings	4.08	0.80	5.11	**1**	3.36	0.99	3.40	**21**	0.93	0.19	**4.93**	**1**

Table 4.4 (b) : Summary of Private Sector Clients' Assessment of Architects' Performance

CRITERIA	Part Three				Part four				Av perf (μp)	Perf std dev	Perf /index	Overall Perf Ranking
	Av imp	Imp std dev	Imp index	Imp rank	Av achi	Achi std dev	Achi index	Achi rank				
Understanding client's corporate objectives	3.33	1.01	3.29	**28**	3.36	0.85	3.94	**9**	0.87	0.44	1.96	**12**
Forethought and consideration of users' requirements	3.67	0.86	4.28	**14**	3.56	0.91	3.89	**10**	0.87	0.27	3.25	**6**
Identifying and prioritizing project objectives	4.11	0.91	4.54	**10**	3.28	0.78	4.21	**4**	1.69	1.58	1.07	**21**
Analyzing the design concepts and requirements	4.00	1.01	3.94	**21**	3.47	0.85	4.11	**6**	1.42	0.87	1.62	**16**
The project was designed within budget	3.47	0.74	4.72	**6**	3.06	0.93	3.28	**25**	0.76	0.21	3.53	**2**
Completion of design on time	3.78	0.92	4.09	**18**	3.50	0.94	3.74	**12**	0.88	0.33	2.65	**7**
Design conformance to owner's requirement	4.08	0.81	5.07	**2**	3.42	0.94	3.65	**14**	0.97	0.89	1.09	**20**
Completion and simplification of design	3.94	0.87	4.51	**12**	3.28	0.88	3.72	**13**	0.86	0.68	1.26	**18**
Standardization of elements	3.75	0.97	3.88	**22**	3.03	0.74	4.11	**5**	2.04	2.73	0.75	**28**
Dimensional co-ordination of elements	3.69	0.89	4.16	**16**	3.22	0.83	3.87	**11**	0.98	0.68	1.45	**17**
Flexibility of design for changes	3.39	0.85	3.97	**20**	3.22	0.93	3.47	**20**	1.88	2.17	0.87	**25**
Knowledge of performance characteristics of materials and components	4.00	0.86	4.65	**7**	3.50	0.97	3.60	**16**	0.96	0.48	1.98	**11**
Buildability reviews	3.94	0.76	5.19	**1**	3.36	0.96	3.52	**18**	0.87	0.42	2.08	**10**
Effective participation in supervision and control	3.83	0.84	4.56	**9**	2.78	0.91	3.05	**28**	0.45	0.14	3.30	**3**

Aesthetic and quality of design	Aesthetic and quality of design	3.81	0.87	4.35	**13**	2.61	0.77	3.41	**22**
Quality of specification produced	Good and quality specification was produced	3.67	1.07	3.43	**26**	3.33	0.92	3.62	**15**
Quality of management strategies	Production of quality management strategies	3.81	1.01	3.77	**24**	3.00	0.89	3.36	**23**
Production of quality or as-built manuals	Assist in the production of quality or as-built manuals	3.61	1.08	3.36	**27**	2.83	0.91	3.11	**26**
No rework and deficiency in design	No rework and deficiency in design	3.72	0.89	4.20	**15**	3.08	0.94	3.29	**24**
Design conformance to codes and standards	Design conformance to codes and standards	3.75	1.08	3.48	**25**	3.36	0.83	4.03	**8**
Organizing construction inspection and testing program	Assist in organizing construction inspection and testing program	4.08	0.90	4.54	**11**	2.97	0.83	3.60	**17**
Pre-design project meetings	Pre-design project meetings	3.81	0.77	4.96	**4**	3.36	0.96	3.52	**18**
Assist in defining project strategy	Assist in defining project strategy	3.44	0.84	4.10	**17**	3.22	0.80	4.04	**7**
Involvement of other professionals design at stage	Involvement of other professionals design at stage	3.72	0.81	4.60	**8**	3.50	0.76	4.59	**2**
Co-ordination among phases of design	Co-ordination among phases of design	3.78	0.97	3.88	**23**	3.06	0.99	3.10	**27**
Co-ordination between design and construction	Co-ordination between design and construction	4.17	0.85	4.93	**5**	3.28	0.76	4.30	**3**
Effective communication of design to contractor	Effective communication of design to contractor	3.92	0.96	4.08	**19**	3.53	0.70	5.07	**1**
Project review meetings	Project review meetings	3.39	0.68	5.02	**3**	3.31	0.97	3.41	**21**

4.3 Ranking order of Performance Index Across Sectors

From Table 4.5(a); the ten (10) most ranked criteria by which public clients assessed the performance of architects in terms of importance and achievement assessment in the building sector projects were:

1. Project review meetings
2. Buildability reviews
3. Completion of design on time
4. Forethought and consideration of users' requirement
5. Project was designed within budget
6. Involvement of other professionals at the design stage
7. Pre-design project meetings
8. Effective participation in supervision and control
9. Organizing construction inspection and testing program
10. Completion and simplification of design

This was however different from Table 4.5 (b) for private clients, where the ten (10) most performance ranked criteria were:

1. Project review meetings
2. Project was designed within budget
3. Effective participation in site supervision and control
4. Involvement of other professionals at design the stage
5. No rework and deficiency in design
6. Forethought and consideration of users' requirement

7. Completion of design on time
8. Pre-design project meetings
9. Co-ordination between design and construction
10. Buildability reviews

It can be seen clearly from the above that, eight of the criteria have appear in the two most-ranked criteria lists of both public and private clients. These are listed below

1. Project review meetings
2. Project was designed within budget
3. Forethought and consideration of users' requirement
4. Completion of design on time
5. Involvement of other professionals at the design stage
6. Effective participation in supervision and control
7. Buildability review was carried out
8. Pre-design project meetings

Clearly both sectors considered "project review meeting" as important. The possible rationale for this may be that clients are expecting architects to have sound management expertise in the management of projects in order that they can effectively co-ordinate the whole development process successfully.

both public and private sector clients have indicated, "The project was designed within budget" and "forethought and consideration of users' requirement", as important. This importance accorded these two criteria further buttress the point that clients are not only concerned about final cost of the building, but also the level of satisfaction that accrues to the occupier of the building. Another possible reason for this might be that they are being careful about their expenditure, which means that the building must satisfy the purchaser or occupier, so that it can be put up for sale or rented as soon as possible in order that, they can get back their capital within the shortest period of time.

The choice of "Completion of design on time" would probably mean that they want their designs to be delivered on schedule. A probable reason may be that, they want early selection of contractors for early start on site. Another justification for both clients choosing this criterion as important is, to avoid excessive payment of interest on loans that was contracted for the project due to delays in completing the design on time.

Both clients have also considered "Involvement of other professionals at the design stage" as another important criterion. This shows that, clients appreciate the effort of architects who bring on board other key professionals with the requisite skills and knowledge relevant to the success of the project to constitute an integrated design team. An integrated design team invariably, helps clients in capturing vital project requirements. This will promote proper project planning and implementation, which will lead to successful project delivery.

Another possible reason for them choosing this criterion is that, construction projects organization come with a large number of people with differing and sometimes conflicting interests, which must be co-ordinated, and tune to suit the project objectives. Resolving differences and conflicts are most crucial in the early strategic stages of projects. Therefore, clients would appreciate that architects develop the necessary managerial skills (such as disputes/conflict/) in order to manage the human resource aspect of their project teams.

Both sector clients also ranked "Effective participation in supervision and control" as important. This shows that clients are concerned about specification and quality standard of the building, and the control over the budget of the project. An effective supervision and control system is essential to the successful delivery of construction projects (Hendrickson and Tung, 2000). The benefit of this is that, it helps in checking workmanship of the works and monitoring of project progress.

Clearly, both sectors considered "pre-design project meetings" as another criterion of importance. The likely rationale for this is that, these meetings would afford clients the opportunity to highlight their intentions that would be captured in the project's requirements during theses briefings.

Furthermore, both clients also ranked "Constructability/Buildability review was carried out" as important. This shows again that, they are concerned with buildability of their projects designed. This circumstance might have arisen because of their well-informed knowledge of the benefits of considering buildability from the early stages of the design stage. It can be reasonably,

inferred from the above that clients' choice of buildability reviews should bring to fore buildability issues such as;

- *ease of construction which can be achieved through proper planning and optimum integration of construction knowledge/technology and experience onto the design to achieve the overall project objectives,*
- *factors that may directly affect the productivity of site processes and the efficiency of site management.*

If the above-mentioned issues are dealt with, during buildability reviews, it will help to stream the overall project objectives by maximizing quality while minimizing cost and time. It is also worth to note that, though both clients did not choose the other four key performance indicators concurrently, they are equally important and should be considered by architects. These are; Assist *in organizing construction inspection and testing program, and Completion and simplification of design* for the public sector clients; and *No rework and deficiency in design, and Co-ordination between design and construction* for private sector clients.

One may comfortably say that both sectors' clients were not enthusiastic about the importance the other criteria which were ranked from position 11th to 28th of the overall performance ranking. Hence, it can also be concluded that architects need not devote much attention to them. The above results also confirm previous research by Frimpong *et al., (2003)*, which state that there is prevalence of project delays and cost overruns, and building projects in Ghana are no exception.

4.4 Discussions

4.4.1 Hypothesis testing of differences in mean importance

Two nonparametric statistical test, Mann Whitney U and Wilcoxon test was performed to determine whether there are statistical differences in the mean importance of each criterion between the private and public sectors responses at the 95 per cent level of confidence. Only eight out of the 28 criteria (representing 28.57 per cent) were statistically different in terms of mean importance at the 95 per cent confidence level. This means that over two-thirds (i.e. 71.43 per cent) of the criteria were similarly selected with respect to their importance. Therefore, it can be implied that both sector clients consider the importance of the criteria similarly in evaluating architect's performance at the 95 per cent confidence level. However, it is interesting to note that, there was significant difference in the mean importance of the some key performance indicators or criteria. These indicators/criteria are; "the project was designed within budget" ,"the design was completed on time" and " Understanding client's corporate objectives. Table 4.6 below shows the result using the Statistical Package for Social Sciences (SPSS).

Table 4.6 : Mann-Whitey U and Wilcoxon tests of mean importance between and public and private building projects

PERFORMANCE CRITERIA	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (two-tailed)
Understanding client's corporate objectives	11.00	45.00	-3.60	0.00
Forethought and consideration of users' requirements	55.00	100.00	-1.10	0.17
Identifying and prioritizing project objectives	51.00	96.00	-1.37	0.07
Analyzing the design concepts and requirements	36.50	88.50	-1.80	0.07
The project was designed within budget	36.50	81.50	-2.29	0.02
Completion of design on time	23.00	68.00	-2.92	0.04
Design conformance to owner's requirements	26.50	71.50	-2.69	0.07
Completion and simplification of design	71.50	207.50	-0.03	0.97
Standardization of elements	63.00	108.00	-0.80	0.42
Dimensional co-ordination of elements	38.50	83.50	-2.02	0.05
Flexibility of design for changes	28.50	73.60	-2.63	0.19
Knowledge of performance characteristics of materials and components	63.00	108.00	-0.68	0.50
Buildability review was carried out	61.50	106.50	-0.69	0.49
Effective participation in supervision and control	41.00	86.00	-2.06	0.04
Aesthetic and quality of design	61.50	197.50	.-0.65	0.52
Good and quality specification was produced	59.00	197.00	-0.78	0.44
Production of quality management strategies	61.00	197.00	-0.68	0.50
Assist in the production of quality or as-built manuals	72.00	208.00	0.00	1.00
No rework and deficiency in design	40.00	85.00	-1.95	0.05
Design conformance to codes and standards	67.50	112.50	-0.28	0.78
Assist in the production construction inspection and testing program	49.50	185.50	-1.40	0.16
Pre-design project meetings	67.00	112.00	-0.31	0.76
Assist in defining project strategy	68.50	204.50	-0.22	0.83
Involvement of other professionals at the design stage	41.00	86.00	-1.84	0.07
Co-ordination among phases of design	47.00	92.00	-1.47	0.14
Co-ordination between design and construction	36.00	81.00	-2.23	0.03
Effective communication of design to contractor	70.50	115.50	-0.10	0.92
Project review meetings	54.00	190.00	-1.07	0.29

4.4.2 Hypothesis testing of differences in mean performances

The architects' achievements in the two sectors were compared based on the criteria (refer to *Table 4.7* below). The result indicates that 20 out of the 28 criteria are statistically different at the 95 per cent confidence level. This shows that in spite of the high importance rating that both clients have attached to these criteria, architects' achievements in the two sectors have fallen short of their employers' desired expectation in the delivery of their services.

The comparison of the performance of the architects shown in *Table 4.8* below, indicated that only seven (7) of the 28 criteria (25.00 percent) were statistically different at the 95 percent confidence level, namely "understanding clients' corporate objectives", "identifying and prioritizing the project objective", the project was designed within budget and "completion of design on time ". The rest are, "buildability review was carried out", "involvement of other professionals at the design stage", and "project review was carried out. It is worthy to note here that four of these criteria belong to the **client focus** group.

"The project was designed within budget" was the only criterion indicated to be statistically different by both sectors. Possible reasons may be as follows; the private sector clients' have profit-oriented mindset in their approach to projects, since most of these clients are developers and investors. Again, these clients may mostly, be concerned with return on capital investment. In addition, most of the public sector clients in the building industry are mostly, non-profit oriented organizations. However, issues of value for money are subject of concern, because taxpayers' money is usually involved. That is, one may adduced a possible reason as issues

bordering on public accountability - *obligation of public enterprises and agencies entrusted with public resources to be answerable for their fiscal and social responsibilities assigned to them.*

A possible reason the criterion "the design was been completed to time" was graded differently is that the private sector clients are more time conscious than the public sector clients. Time and cost overruns particularly highlighted by these clients as significant may be due to the lack of proper budgetary control measures during the implementation stages of the project. This might be possible cause of many projects being abandoned at various stages of completion around the country.

Table 4.7 : Mann-Whitey U and Wilcoxon tests of mean achievement between public and private building projects

PERFORMANCE CRITERIA	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (two-tailed)
Understanding client's corporate objectives	8.40	36.00	-4.29	0.03
Forethought and consideration of users' requirements	9.00	45.00	-3.90	0.02
Identifying and prioritizing project objectives	58.50	94.50	-1.29	0.20
Analyzing the design concepts and requirements	72.00	108.00	-0.68	0.50
The project was designed within budget	55.00	91.00	-1.54	0.12
Completion of design on time	61.00	97.00	-1.19	0.23
Design conformance to owner's requirements	82.50	313.50	-0.08	0.93
Completion and simplification of design	16.00	52.00	-3.73	0.00
Standardization of elements	80.50	311.50	-0.19	0.85
Dimensional co-ordination of elements	19.50	55.50	-3.49	0.00
Flexibility of design for changes	70.00	106.00	-0.85	0.40
Knowledge of performance characteristics of materials and components	66.00	297.00	-1.01	0.31
Buildability review was carried out	19.00	55.00	-3.41	0.01
Effective participation in supervision and control	16.00	52.00	-3.54	0.00
Aesthetic and quality of design	24.00	60.00	-3.19	0.01
Good and quality specification was produced	4.50	40.50	-4.15	0.00
Production of quality management strategies	3.70	36.00	-4.30	0.00
Assist in the production of quality or as-built manuals	1.50	37.50	-4.19	0.00
No rework and deficiency in design	2.80	36.00	-4.32	0.00
Design conformance to codes and standards	21.00	57.00	-3.33	0.01
Assist in the production construction inspection and testing program	16.00	52.00	-3.67	0.00
Pre-design project meetings	28.00	64.00	-2.94	0.03
Assist in defining project strategy	28.00	64.00	-3.11	0.02
Involvement of other professionals at the design stage	24.00	60.00	-3.18	0.01
Co-ordination among phases of design	28.00	64.00	-3.07	0.20
Co-ordination between design and construction	68.00	104.00	-0.85	0.40
Effective communication of design to contractor	36.00	72.00	-2.44	0.02
Project review meetings	8.00	44.00	-4.17	0.01

Note: Criteria in italics show that there are mean differences between both sectors

Table 4.8 : Mann-Whitey U and Wilcoxon tests of mean performance between private and public building projects

PERFORMANCE CRITERIA	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (two-tailed)
Understanding client's corporate objectives	16.00	65.40	-3.61	0.21
Forethought and consideration of users' requirements	14.00	70.00	-1.51	0.13
Identifying and prioritizing project objectives	6.00	79.00	-2.09	0.04
Analyzing the design concepts and requirements	17.00	52.00	-0.95	0.34
The project was designed within budget	15.5	75.00	-2.18	0.08
Completion of design on time	17.00	78.5	-2.63	0.18
Design conformance to owner's requirements	9.00	87.00	-0.57	0.57
Completion and simplification of design	12.80	77.20	-0.32	0.75
Standardization of elements	13.5	86.60	-0.13	0.90
Dimensional co-ordination of elements	10.50	44.00	-0.20	0.85
Flexibility of design for changes	15.5	75.00	-2.18	0.08
Knowledge of performance characteristics of materials and components	11.5	89.50	-0.11	0.92
Buildability review was carried out	16.00	81.00	-2.23	0.23
Effective participation in supervision and control	14.70	89.00	-0.23	0.82
Aesthetic and quality of design	10.50	87.00	-0.60	0.55
Good and quality specification was produced	13.00	66.50	-1.91	0.60
Production of quality management strategies	15.00	70.00	-1.39	0.17
Assist in the production of quality or as-built manuals	17.00	79.5	-1.82	0.41
No rework and deficiency in design	12.00	89.00	-0.48	0.84
Design conformance to codes and standards	10.50	84.50	-1.40	0.16
Assist in the production construction inspection and testing program	14.00	72.5	-0.21	0.82
Pre-design project meetings	18.00	86.00	-0.82	0.41
Assist in defining project strategy	18.5	86.5	-0.73	0.47
Involvement of other professionals at the design stage	18.60	90.00	-2.28	0.57
Co-ordination among phases of design	12.00	83.00	-1.24	0.96
Co-ordination between design and construction	11.00	64.00	-0.24	0.83
Effective communication of design to contractor	9.50	56.50	-1.02	0.31
Project review meetings	14.50	68.00	-1.19	0.28

Note: Criteria in italics show that there are mean differences between both sectors

4.5 Comparison of architects' performance across sectors

To compare architects' performance in the building projects of private and public sectors the performance index was used. Table 4.9 summarizes architects' performance in private and public sector building projects (Tables 4.9(a) and 4.9(b)) by classifying them as "satisfactory" and "unsatisfactory". From these tables, any criterion with **performance index** above three is said to be good and architects have delivered a satisfactory performance with respect to that criterion. Likewise, any criterion below three (3) means that the architects' performance was unsatisfactory and they need to improve their performance on that particular criterion. For public sector building projects, the architects have performed satisfactorily in twelve (12) out of the 28 criteria, representing 42.86 per cent.

Similarly, in the private sector building projects, only six (6) of the 28 criteria (21.43 per cent) were performed satisfactorily. This indicates that architects performed better in public sector projects than private sector projects. A probable reason is that public sectors clients such as the ministries and agencies (e.g. SSNIT, GETfund, ECG, GWC, etc.) usually, have an in-house project executive team. This team comprises of various professionals such as architects, engineers and quantity surveyors working in the government establishment who would review the architect's work. This is uncommon in the private sector clients, and which might be the cause of the low level of performance in this sector, as shown in Table 4.9a

Architects' performance was identified satisfactory by both sectors in only five (5) of the 28 criteria. The five common criteria are "Forethought and consideration of users' requirement", "The project was designed within budget", "Effective participation in supervision and control",

"Involvement of other professionals at the design stage" and "project review meetings". Therefore it can be concluded that architects need to improve their performance significantly in about 82 per cent or (21) of the list of criteria identified in the research.

Table 4.9 (a): Classification Architects' Performance in the Public and Private Sector

PERFORMANCE CRITERIA	Public Sector Projects	Private Sector Projects
Satisfactory Performance (Perf index ≥ 3)	• Forethought and consideration of users' requirements • The project was designed within budget • Completion of design on time • Completion and simplification of design • Knowledge of performance characteristics of materials and components • Effective participation in supervision and control • Aesthetic and quality of design • Assist in the production construction inspection and testing program • Pre-design project meetings • Involvement of other professionals design at stage • Effective communication of design to contractor • Project review meetings	• Forethought and consideration of users' requirements • The project was designed within budget • Effective participation in supervision and control • No rework and deficiency in design • Involvement of other professionals design at stage • Project review meetings

Table 4.9 (b): Classification Architects' Performance in the Public and Private Sector

Performance Criteria	Public Sector Projects	Private Sector Projects
Unsatisfactory Performance (Perf index ≤ 3)	• Understanding client's corporate objectives • Identifying and prioritizing project objectives • Analyzing the design concepts and Requirements • Design conformance to owner's requirements • Standardization of elements • Dimensional co-ordination of elements • Flexibility of design for changes • Buildability review was carried out • Good and quality specification was produced • Production of quality management strategies • Assist in the production of quality or as-built manuals • No rework and deficiency in design • Design conformance to codes and standards • Assist in defining project strategy • Co-ordination among phases of design • Co-ordination between design and construction	• Understanding client's corporate objectives • Identifying and prioritizing project objectives • Analyzing the design concepts and requirements • Completion of design on time • Design conformance to owner's requirements • Completion and simplification of design • Standardization of elements • Dimensional co-ordination of elements • Knowledge of performance characteristics of materials and components • Buildability review was carried out • Aesthetic and quality of design • Good and quality specification was produced • Production of quality management strategies • Assist in the production of quality or as-built manuals • Design conformance to codes and standards • Assist in the production construction inspection and testing program • Pre-design project meetings • Assist in defining project strategy • Co-ordination among phases of design • Co-ordination between design and construction • Effective communication of design to contractor

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY OF MAJOR FINDINGS

This study examines and compares the performance of architects with respect to clients' importance over a set of performance criteria in the Ghanaian private and public sector building projects. Two main analyses focusing on similarities and differences of the two sectors over a set of selected criteria identified from the literature were performed.

The first analysis compared the importance attributed by the clients in both private and public sector building projects based on the importance index, and hypothesis testing of differences in mean importance. The results revealed that private sector clients are more likely to be concerned primarily with cost while the public sector clients with buildability of designs.

The hypothesis testing based on the Mann-Whitney- Wilcoxon tests revealed that 71.41 per cent the criteria are not statistically different with respect to their importance. This means that there is a high degree of mutual relationship between the two sectors in terms of their rating of the criteria. However, key project performance indicators/criteria such as "the project was designed within budget" and "the design was completed on time" were found to be statistically different in terms of their mean importance.

The second analysis examined architects' performance across the private and public sectors. The performance was satisfactory in **41** per cent of the 28 criteria in the private sector as compared to

the **58** per cent in the public sector. The aggregated results revealed that architects need to improve their performance in about **52** per cent of the 28 criteria.

The Mann-Whitney-Wilcoxon tests revealed that **25** per cent of the criteria were indicated as statistically different (at the 95 per cent confidence level) between the private and the public sectors in terms of performance. Key project performance criteria namely "quality management strategies were produced", "the project was designed within budget" and "the design has been completed to time" were found to be statistically different.

A possible reason for this development is that private sector clients are more time and cost conscious than the public sector clients, whose projects implementation process are characterized by improper planning and poor budgetary control. This development has led to final project cost and duration spiraling out of control. Worst of all, many these public sector building projects at various stages of completion across the country are abandoned.

Furthermore, it was observed that in the application of the performance index to determine the overall performance of architects', it came to light that, architects rather, performed better in public sector projects (42 percent) than private sector building projects (21 percent). An attributable reason being that public sectors clients (e.g. Ministries , Agencies and Department, Tertiary institutions, etc.) usually, have an in-house project team or departments. These departments are often made of various construction professionals such as architects, engineers and quantity surveyors who have oversight control of the projects. professionals also review the works of the architects' employed. This is most often, not common in the private sector clients originations, and which might be the cause of the low level of performance in this sector.

Additionally, this research has also revealed that the traditional procurement system remains by far (87 percent of all contracts awarded within past five years) the most popular method used by the building construction clients to acquire their construction products in Ghana. The other forms of procurement in aggregate only form a small portion (13 percent) of all construction transactions. Conceivable reason for this development may be that the traditional structure for projects procurement is seen as a sequential method, because the client/employer takes his/her scheme to an advanced stage with his/her professional team before appointing a contractor. However, there is segregation of responsibilities under this type of procurement route as design is separated from construction.

5.1.1 Summary of comments

The objectively measured clients' assessment of the performance of architects' demonstrated that the level of performance of architects in successful delivery of building projects is satisfactory. However, the general comments gathered from clients during the questionnaire survey are, summarized as follows;

- *Some of the architects don't give prompt site instructions that will help contractors to execute the project on the agreed schedule.*

- *Clients desire to see more professional advice on the type of procurement routs that best suits their need.*

- *A number of architects lack the necessary project management skills for effective planning and implementation of construction projects. This has affected coordination of the design and the control of construction, which ultimately influenced the successful delivery of project.*

- *Most often, some architects are found of not discussing variations issues with clients before giving instructions to contractors to execute them.*

- *Some architects do not show much commitment to their projects during the construction stage. This does not ensure effective supervision, and sometimes result into poor workmanship and wrong specification.*

- *Architects do not spend adequate time on consultation with prospective clients in order understand their briefs, which ensure clarity of the design. Unambiguous understanding of clients' briefs helps reduce reworks and variations to minimum, and also promote effective control of budget and completion time.*

- *Some of the designs are not tropicalized which has led to low energy efficiency and high cost of electricity during their usage.*

- *It is the desire of clients that architects would be able to provide alternatives in their designs and good choice of material specifications. Sometimes, materials and components that are specified are to be imported which increases the overall cost of the project.*

- *Often times, architects lack the understanding of how to properly and effectively manage the internal spaces within the building during the design. Proper organizations of the spaces within the building enhance efficient spaces utilization within the building. It also has psychological influence on the users. For instance, the spatial environment has influence on the health, the mind, and the behaviour of people in and around organizations. It can cause illness, such as with the sick building syndrome. However, it can also positively influence the vitality of people or the recovery after an operation (Ulrich, 1984).*

The spatial environment influences is also related to practice-based areas of management such as facility management which is primarily devoted to the maintenance and care of commercial or institutional buildings and to property management in which the operation of real estate is central.

- *A number of financial institutions clients desire to see architects to brand or portray the image of their organizations in the design concepts. The architect should be able to portray the uniqueness of their corporate organizations within the design. That's, the building should be able project the image of organization, reflect or reinforce the core purpose of the corporate brand. The finished building should be able to establish a relationship the client's organization and its clientele by projecting the firm's image in the competitive environment.*

In conclusion, the findings from this research provide a very useful information as feedback to architects in future projects. Information revealed the priorities for clients from the public and private sectors, which would also be informative for their project participants, such as the contractors, engineers and project managers.

5.2 CONCLUSIONS

5.2.1 Introduction

Since the aim of this research was achieved through the objectives set out in chapter one, the conclusion is organized after the order of the objectives as in the ensuing sections

5.2.2 Identified Performance criteria

Though clients rate some criteria as very important and important, others were rated as least important. Performance criteria such as: "Project review meetings"; "Completion of design on time"; "Forethought and consideration of users' requirement"; "Project was designed within budget"; "Involvement of other professionals at the design stage"; "Effective participation in

supervision and control" were among the ten (10) most ranked criteria as important by public and private clients.

The ten most important ranked criteria by private sector clients were: Project review meetings, "Project was designed within budget", "Effective participation in site supervision and control", "Involvement of other professionals design at stage", " No rework and deficiency in design", "Forethought and consideration of users' requirement", "Completion of design on time", "Pre-design project meetings", "Co-ordination between design and construction", and "Buildability review was carried. This clearly showed that private clients attached more importance to buildability issues. It also means architects should focus on technical issues such as design detailing, reviewing of the design as the construction progress on site, and site construction planning in order to avoid remedial works at site. It also enhances delivery of good and quality construction products as supervision and quality measures are put in place. Another possible reason for private clients rating criteria "Involvement of other professionals at the design stage is to promote partnering between the design team and the contractor's team. Most often, architects resent the involvement of other professionals especially contractors in the design process.

5.2.3 Measured Performance of architect across the two Sectors

A table of architects' performance (i.e. ratio of the ***important*** of the criteria and the ***achievement*** of the architect) was constructed based on the projects in which they were engaged by clients. The clients were again asked to rate the achievement of their architects in line with the importance of the criteria rated. A performance index was then adduced. This formed the basis for determining how satisfactorily architects have performed across the two- sector clients of the

building industry. With regards to public sector projects, architects have performed 61% to clients' satisfaction, that is, 17 out of the 28 performance criteria. This means that, 39 % of architects' performance was below the satisfaction in public sector projects.

On the other hand, the performance of architects to private clients' satisfaction in the building industry on projects was 46%. That is, with regards to the performance index, only 13 out of the 28 criteria were satisfactorily performed to the desired satisfactory expectation of private sector clients in the building industry. This means that, 54 % of architects' performance was below clients' satisfaction in private sector projects. However, the performance of architects across the two sector clients was generally satisfactory.

5.2.4 Comparison of performance of Architects between the two sector clients

The observation of existence or non-existence of significant difference between the two sector clients' assessment of architects' performance was done using the Mann-Whitney U and Wilcoxon test for two-independent samples as shown in Table 4.7. The significant or statistical differences between these two clients (was on the criterion- "The project was designed within budget"). The significant difference stems from their sectors' corporate objectives. This explains that private sector clients have profit oriented mind set in their approach to projects, whilst most of the public sector clients, though non-profit oriented organizations, were concerned with issues of value for money for tax-payers money.

5.3 RECOMMENDATIONS

5.3.1 Specific Recommendations to Architects

- Architects should endeavour at all times to have early discussions of variations to the design early with their clients, and seek approval before issuing such orders to contractors. This will help minimize disputes and boost the level of trust between clients and the design teams. When clients are able to fully understand, the financial ramifications of such variations before orders are issued, it creates a sense of purpose and better business relationship between them.

- The practice of issuing late or no site instructions to contractors should as much as possible be avoided, it has the cumulative effect of delaying the planned execution of the project. Instances where contractors carried out verbal instructions without the architect's confirmation should not be promoted.

- In order to minimize changes to the design during construction, architects should devote much time to clearly understand their clients' briefs before the building is designed. Any change made after final design result in cost and time overruns.

- In order to coordinate effectively and manage the whole construction process successfully, it is prudent that architects diversify their core knowledge base in design into project management related fields. This will grant them the added advantage over other professionals in the design team with management background.

- As contract administrators, architects should always develop the posture of promoting teamwork among the project team. This is a core requirement for the success of every project. Promoting teamwork among the project requires real commitment from all parties involved, but brings benefits that far outweigh any perceived disadvantages. It minimizes dispute and help the team members to be focus and committed to the project's objectives.

- In pursuance of consolidating their business relationships, architects should develop strategies of partnering with clients in the building industry for successful delivery of projects. This will enhance their performance on projects through post implementation views of lessons learnt on previous projects, which will promote good business relations.

5.3.2 Recommendation for Further studies or Future Research

For a further research or studies, it is recommended that a model should be constructed out of the criteria for predicting the overall performance of architect's in the building delivery process. It is belief that this will also provide an opportunity for further understanding of the importance of these identified criteria.

The model could be in two parts: The first part should be a questionnaire survey based on identified criteria. This will consist of about 80-90 clients, which will be used to construct the model while; the second part will consists of another set of clients of about 15 – 25 which will be used to validate the model. Based on this data, a predictive discriminant analysis model of two-group cases (good and poor performance) should be developed. The model can therefore be

used as predictive tool for measuring the overall performance of architects or consultants at a certain level of significant that will correlate with the actual validated client ratings.

Moreover, this research can be expanded to cover other key professionals in the constructions industry, such as engineers and Quantity surveyors involve in the construction process. In that case, common performance criteria should be identified, which will form the bases for assessing their (the design team's) overall performance.

BIBLIOGRAGHY

Abdul, O.L.A., (2008), assessing the practice and the prospect of Value Management in the Nigerian Construction Industry; Master's Thesis, International Islamic University of Malaysia.

Anderson, C. A., Bushman, B. J. (2002) Human aggression. *Annual Review of Psychology,* 27–51.

Ang, A.H.S., Tang, W.H. (1984); Probability Concepts in Engineering Planning and Design, Jojn Wiley & sons, New York, NY, Vol. 2

Arditi, D., Gunaydin, H.M. (1997), "Total quality management in construction process", *International Journal of Project Management*, Vol. 15 No.4, pp.235-43.

Ashworth, A. (2004), Cost Studies of Buildings, Pearson Education Limited, Prince Hall; 4th Ed.

Ashworth, A., Hogg, K., (2007), Willies Practice and Procedure for the Quantity Surveyor; Blackwell Publishing

Atkins, B. (1994), Building Features: A Report on the Future Organization of the Building Process, University of Reading, Reading.

Atkinson R, (1999), Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. International Journal of Project Management; 17; 6; 337-342

Babbie, E. (1989). *The Practice of Social Research.* 5th ed., Belmont, Wadsworth Publishing Company, CA

Bamisile, A. (2004). Building Production Management. Foresight Press Limited, Lagos, Nigeria, pp. 22-148.

Banks A., Nicholson, P (1993), "The architect-designer, inspector, observer; Architectural Management Practice and Research. Proceeding of the 1996 Architectural workshop. International Council for Building Research Studies and Documentation (Rotterdam)

Barrett, P.S., Stanley, C. (1999), Better Construction Briefing, Blackwell Science, Oxford

Barry, T.J. (1991), Management Excellence through Quality, ASQC Quality Press, Milwaukee, WI,

Bertelsen, S., Fuhr Petersen, K., Davidsen, H. (2002), The Client as Agent for Changes – Towards a New Culture in Building Bygherreforeningen Danmark, Fonden Realdania, Byggecentrum, Ballerup.

Blyth, A., Worthington, J. (2001), Managing the Brief for Better Design, E. & F.N. Spon, London, .

Byggherre Forum (2006), The Role and Mission of the Construction Client, Swedish Construction Clients Forum, Stockholm

Chan, A.P.C. (1997), "Measuring success for a construction project", The Australian Institute of Quantity Surveyors

Chan. A.P.C.,(2004), "Key Performance indicators for measuring construction success" Benchmarking: Emerald Group of Publishing Limited

Chang, A.S., Ibbs, C.W. (1998), "Development of consultant performance measures for design projects", *Project Management Journal*, Vol. 29 No.2.

Chappell, D., Willis, C.J. (2000), the Architect in Practice, 8th ed., Blackwell Science, Oxford.

CIRIA (1983), Buildability: An Assessment, CIRIA Publications, London, Vol. Vol. 26

CIRIA (1985), CIRIA Report 109, CIRIA, London, .

Cooke-Davis, T. (2002). The 'real' success factors on projects. *International Journal of Project Management,* Vol. 20, pp 185-190

Coxe, W. (1980), Managing Architectural and Engineering Practice, John Wiley & Sons, New York, NY, .

Daily Graphic (Accra) various issues from February 2003 to February 2005, Graphic Communications Group Ltd. April 23, 2004.

Dallas, M.F. (1992), "Value Management- its relevance to managing construction projects", in Nicholson, P. (Eds), *Architectural Management*, E&FN spon, London, pp 24- 45.

Moore, D. (1996) "Buildability assessment and the development of an automated design aid for managing the transfer of construction process knowledge", Engineering, Construction and Architectural Management, Vol. 3 Iss: 1/2, pp.29 – 46

Egan, J. (1998) Rethinking Construction, Department of the Environment, Transport and the Regions, London.

Eldin, N. (1988), "Constructability improvement of project designs", Journal of Construction Engineering and Management, ASCE, Vol. 114 No.4,

Elinwa, A.U., Joshua, M. (2001), "Time overrun factors in Nigeria construction industry", *Journal of Construction Engineering and Management*, ASCE, Vol. 127 No.5.

Emmitt, S. (1999), *Architectural Management in Practice*, Addison-Wesley Longman, Glen View, IL.

Fan, C.N. (1995), "The development of quality assurance in Hong Kong construction works", Hong Kong Contractor, March/April,

Fellows, R. and Liu, A. (2006), Research Methods for Construction; Blackwell science Ltd; 3rd Ed.

Fidelis, O. Achi, Henry N. Onukwube and Oluwaseyi M. Ajayi (2007); An Assessment of Quality Management of Building Projects in Nigeria; The construction and building research conference RICS, Georgia Tech, Atlanta USA, September 2007, pp. 1-2

Fisher, D.J., and Rajan N. (1996). Automated Buildability: Analysis of Workzone Traffic Control Planning, J. Construction Engineering and Management, ASCE, vol, 122, No. 1,

Frimpong,Y. ,Oluwoye, J., Crawford, L. (2004)."Causes of delay and cost overruns in construction projects in a developing countries; Ghana as a case study". Master's Thesis in Project Management Program, University of Technology, Sydney, Australia.

Fristedt, S., Ryd, N. (2003), The Former the Better, Briefing in the Early Phase of the Design and Construction Process The Swedish Association of Local Authorities and Regions, Stockholm, (in Swedish).

Granath, J.Å., Hinnerson, J. (2002), "Discrepancies between clients' goals and the outcome of design processes", paper presented at IFMA World Workplace Europe, Paris

Griffith, A. (1984), "A critical investigation of factors influencing buildability and productivity", PhD thesis, Department of Building, Heriot-Watt University, Edinburgh,

Griffin, A., and Hauser, H.R., (1993), *The Voice of the Customer;* Marketing Science/ Operations Research Society. Vol 12, No.1, Winter 1993

Harris, F.K, and Kometa, S. T. (1995), Clients Assessment of Project team Performance; *Construction Management and Economics*, Volume 12, Issue 5 September 1994.

Hendrickson. C and Tung A. (2000); Project Management for Construction: Fundamental Concepts for Owners, Engineers, Architects and Builders., Prentice Hall, 2ed

Hubbard, B. (1995), Theory of Practice: Architecture in Three Discourses, MIT Press, Boston, MA.

Ireland, V. (1984), "The role of managerial actions in the cost, time and quality performance of high rise commercial building projects", PhD thesis, University of Sydney, Sydney.

Kaderlan, N. (1991), Designing Your Practice: A Principal Guide to Creating and Managing Design Practice, McGraw-Hill, New York, NY

Kamara, J., Anumba C., Evboumwa, N. (2002) "Capturing client requirements in construction projects: Thomas Telford Ltd; London

Kish L., (1965), Survey Sampling, John Willy and Sons Inc., New York.

Kometa S, Olomolaiye P O and Harris F C (.1995); An Evaluation of Clients' needs and Responsibilities in the Construction Process. *Engineering, Construction and Architectural Management*, vol 2; pp 45-56.

Kwakye, A.A., (1997), Construction project Administration in practice; Addison Wesley Longman Limited

Kwo W.T., Lukumon, O. (2005), Model for Examining architects performance in Nigerian private and public sector building projects. *Engineering, Construction and Architectural Management*, 12, 52-68

Latham, M. (1994), Constructing the Team, Final Report of Government/Industry Review of Procurement and Contractual Agreement in the UK Construction Industry, HMSO, London

Lehman, D.R., (1989), *Market Research and Analysis*, 3rd Ed. Irwin, Home- wood IL

Lindahl, Nina Ryd, (2007) "Clients' goals and the construction project management process", Facilities, Vol. 25 Iss: 3/4, pp.147 – 156

Lores HG.V. (1997) Assessment of Buildability Practices among General Contractors in the South East of the United States. Thesis, University of Florida, Gainesville,.

Lukumon O. Oyedele, Kwok W. Tham, (2005) "Examining architects' performance in Nigerian private and public sectors building projects", *Engineering, Construction and Architectural Management*, Vol. 12 Iss: 1, pp.54 - 74

Macdonald J., Piggott J, (1990), Total Quality Management; A Journey Towards Excellence; Butterworth-Heinemann, 1990.,

Macdonald, J., Piggott, J. (1990), Global Quality: The New Management Culture, Mercury Books, London,

Maister, D.H. (1993), Managing Professional Service Firms, Free Press, New York, NY,

Mansfield, N.R., Ugwu, O.O., Doran, T. (1994), "Causes of delay and cost overruns in Nigerian construction projects", *International Journal of Project Management*, Vol. 12 No.4

Melchers, R.E (2001), *Structural Reliability Analysis and Prediction*, John Wiley & Sons; New York NY

Moser, C. A., Kalton, G. (1971), Survey Methods in Social Investigation, Heinemann Educational, London,.

Murdoch, J., and Hughes, W. (2000), Construction Contracts Law and Management. Taylor and Francis, London.

O'Reilly, J.,J.,H (1987), Better Briefing means Better Buildings., Building Research Establishment (BRE) Report 95

Obiegbu, M.E. (2004). Buildability and Maintainability Analysis. *The Professional Builder*, Journal of the Nigerian Institute of Building, pp. 3-8.

O'Connor, J., Tucker, R. (1986), "Industrial project constructability improvement", *Journal of Construction Engineering and Management*, Vol. 113 No.2,.

Parmenter, D. (2007), Key Performance Indicators. John Wiley & Son.

PawLey, M. (1990), Theory and Design in the Second Machine Age, Basil Blackwell, Oxford

Paw Pheng, L. S., Chuan, Q. T. 2006. Environmental factors and work performance of project managers in the construction industry, *International Journal of Project Management* 24(1): 26–33.

Pongpeng, P. and Liston, J. (2003). Contractor Ability Criteria: A View from the Thai Construction Industry. *Construction Management and Economics*, **21**(3), 227-236

Rechtin, E., Maier, M. (2000), The Art of Systems Architecting, 2nd ed., CRC Press, Boca Raton, FL.

Rezgui, Y., Bouchlaghen, D., Austin, S. (2003), "An IT-based approach to managing the construction brief", *International Journal of IT in Architecture, Engineering and Construction*, Vol. 1 No.1

Melchers, R.E (2001), Structural Reliability and Prediction. John Wiley & Sons, New York NY

Rogers, L. (1995), "Generation X", RIBA Journal, July.

Rowlinson, S.M. (1988), "An analysis of factors affecting project performance in industrial building", PhD thesis, Brunel University, London

Rush, R.D., (1986). *The Building System Integration Handbook*, Butterworth, Heinemann,

Ryd, N. (2003), *Exploring Construction Briefing. From Document to Process*, Reproservice Chalmers, Göteborg,

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

Ryd, N., Fristedt, S. (2007), "Transforming strategic briefing into project briefs", *Facilities*, Vol. 25 No.5/6, pp.185-202.

Sanvido Vr, Francois G, Kevin P, Moris G, Michael C (1992). Critical success factors for construction projects, J. Construction. Engineering Management. 118: 1

Sidwell, A.C. (1982), "A critical study of project team organisational forms within the building process", PhD thesis, The University of Aston in Birmingham, Birmingham, UK,

Smith, G., Morris, T. (1992), Exploiting Shifting Boundaries, Strategic Study of the Profession, Phase 1, Royal Institute of British Architects (RIBA), London,

Spencer, N., Winch, G. (2002), How Buildings Add Value for Clients, Construction Industry Council/Thomas Telford, London, .

Symes, M., Eley, J., Seidel, A.D. (1995), Architects and Their Practices: A Changing Profession, Butterworth Architecture, Oxford

Tatum, C.B. (1987), "Improving constructability during conceptual planning", *Journal of Construction Engineering and Management*, ASCE, Vol. 113 No.2,

Taylor, M., Hosker, H.H. (1992), Quality Assurance for Building Design, Longman Scientific & Technical, London, .

The Aqua Group (2007); Guide to Procurement, Tendering and Contract Administration; Blackwell Publishing Ltd

Tindiwensi, D (1996) Steel Structure Buildability Considerations in Developing Countries. Paper to Structural Steel Developing Africa, Conference' 1996, Sandton, Gauteng, South Africa.

Uhlik, F.T., and Lores, G.V. (1998). Assessment of Buildability Practices among General Contractors. *Journal Of Architectural Engineering*, Vol. 4 No.3.

Ulrich, R.S. (1984); "View Through a Window May Influence Recovery from Surgery" American Association for the Advancement of Science; online: www.sciencemag.org *March 14, 2008*

Walker, A. (1996), Project Management in Construction, 3rd ed., Blackwell Science, Cambridge,

Walker, D H T (1997) Choosing an Appropriate Research Methodology. *Construction Management and Economics*, 15, 149-159

Yahya, I.A., Abdul H.R., Berawi, M.A., Karim, S.B.A., Yee, K.L. (2007), "*Value Management In Analyzing Project Brief*" Quantity Surveying International Conference; 4-5 September, 2007 Kuala Lumpur, Malaysia

APPENDIX

APPENDIX A: QUESTIONNAIRE TO BUILDING CONSTRUCTION CLIENTS

Introduction

Architects play a very important role in the construction industry. They serve as facilitators of the construction process, right from inception to commission of building projects. The ability of architects to conceptualize designs in terms of plan-shape and size, most often, make them the first point of call when clients have decided to either construct a new project or carry out refurbishment works. Above all, they lead the design team, hence clients look-up to them for successful delivery of their projects.

Often, architects are designated as contract administrators, and they have the highest delegated authority in any project under the traditional procurement method of contracting building works. They are not only responsible for carrying out the design of the works, but also the vast majority of the administrative duties under the contract on behalf of the employer. In addition, they are the only channel of communication between the project team and the client except on the occasions where a project manager is engaged. Therefore, by acting on behalf of clients it is incumbent upon them to co-ordinate the activities of the project team, and make sure that clients' expectations and requirements are met at the end of the project.

Thus, it is expected that in performing these delegated roles under the contract, architects clearly understand their clients objectives in order to satisfy them. Satisfied clients promote sustenance of good business relationships. It also helps to foster partnership and the successful delivery of building projects. Consequently, it has become very important to examine clients' perception of the performance of architects. This will help architects to appreciate how clients perceived their performance in project delivery process.

Purpose

This questionnaire is to collect data as part of an MSc research being undertaken by **Mr. Cornelius Atsu Dafeamekpor** at the Department of Building Technology, Kwame Nkrumah University of science and Technology, Kumasi, Ghana, as a partial fulfillment of the masters' programme. The research seeks to investigate into how clients would assess the performance of architects in the building industry in Ghana.

Objectives of the study

- To identify set of performance criteria for evaluating architects' performance.
- To assess clients satisfaction with the performance of architects based on the identified performance criteria.
- To formulate possible further steps that will enhance the performance of architects in successful project delivery.

Feedbacks to respondents

Any information given out in this questionnaire will be handled with utmost discretion, and all respondents will remain anonymous. If you are interested in the outcome of this dissertation, i will be pleased to send you the summary of findings once it is completed.

Instruction to respondents

The questionnaire has been divided into five (5) parts; part one gathers the background information about you the respondent and the organization you work for. Part two gathers information about chosen project(s) undertaken by your organization or company within the past five (5) years as construction client; Parts three and four contain series of statements or criteria for you to rank for importance/assessment by indicating (ticking) in their corresponding boxes on the scale from 1 to 5. Part three also requires respondents to state other criteria that could also be used to assess architects'/contract managers' performance. Lastly, part five let you comment generally on your (clients') perception of architects' performance in successful building projects delivery in Ghana.

Any question concerning this research can be directed to the author through the e-mail at atsudaf_c@yahoo.com; atsudaf@gmail.com or Cell no. +233-24-447 4920

I hope that completion of the questionnaire will not take longer than 20 – 30mins of your precious time.

I thank you most sincerely for your very valuable contribution to this research project.

Cornelius Atsu Dafeamekpor
MSc Construction Management
Department of Building Technology
KNUST, Kumasi, Ghana.

PART ONE: RESPONDENT AND COMPANY BACKGROUND

Name of Company :.....

Address :.....

E-mail :.....

Date :.....

Please tick the boxes and fill in the blanks if you select others

1. Gender: Male [ ] Female [ ]

2. Position in the company specialization

a. CEO [ ]
b. MD [ ]
c. Chief Director [ ]
d. Director [ ]
e. Other [ ]

Specify.....

3. What type of organization do you work for?

a. Public [ ]
b. Private [ ]

4. Which of the following field of does your company belong to?

a. Health [ ]
b. Banking/Finance [ ]
c. Media [ ]
e. Telecommunication [ ]
d. Agriculture [ ]
f. Trading [ ]
g. Other [ ]

Specify.....

5. What is your company's experience in the construction industry as a client?

a. 0 – 5years [ ]
b. 6 – 10years [ ]
c. 11 – 15years [ ]
d. 16 – 20years [ ]
e. More than 20years [ ]

PART TWO: PROJECT INFORMATION

Select one project which your company has engaged an architect or architectural firm as the contract administrator or the leader of the design team

Project Title : .....

Project Value (GH¢) : .....

Year of execution : .....

Name of Architectural firm : .....

1. What was the type of project?

a. School [ ]
b. Hospital [ ]
c. Office [ ]
d. Hotel [ ]
e. Residential [ ]
f. Shopping mall [ ]
g. Other [ ]

Specify .....

2. What type of procurement arrangement was used?

a. Traditional contract [ ]
b. Design and build [ ]
c. Turnkey [ ]
d. Management [ ]
Contracting [ ]

3. Has the project suffered any set-backs?

a. Yes [ ]
b. No [ ]

4. What was the nature of the setback?

a. Cost overrun [ ]
b. Time overrun [ ]
c. Other [ ]

Please give details .....
.....
.....

5. Have you experienced any problem of over design?

a. Yes [ ]
b. No [ ]

Please give details.....
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6. Have you received effective supervision and control from your architect?

a. Yes [ ]
b. No [ ]

Please give details.....
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7. Were there quality problems on the project?

a. Yes [ ]
b. No [ ]

Please give details .....
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PART THREE: PERFORMANCE CRITERIA RATING

The table below contains four (4) categories or groups of performance criteria that were identified during literature search. Please rate each of the performance criteria in the table below on a scale of 1 to 5, where each scale represents the following rating: (5) = extremely important, (4) = important, (3) = fairly important, (2) = least important, (1) = not important

Question: How do you rate the following criteria as to their importance in contributing to the performance of the architect you have engaged on your chosen project?

CATEGORY/ GROUP	PERFORMANCE CRITERIA	RATING				
		1	2	3	4	5
1. Client Focus	1.1 Understanding client's cooperate objectives					
	1.2 Forethought and consideration of users' requirements					
	1.3 Identifying and prioritizing project objectives					
	1.4 Analyzing the design concepts and requirements					
	1.5 The project was designed within budget					
	1.6 Completion of design on time					
	1.7 Design conformance to owner's requirements					
	Do you have any other criteria that should be considered? Please specify below and rank					
	i.					
	iii.					
	Kindly state your reason(s) for choosing the above					
	Criteria					
2. Buildability of design	2.1 Completion and simplification of design					
	2.2 Standardization elements					
	2.3 Dimensional co-ordination of elements					
	2.4 Flexibility of design for changes					
	2.5 Knowledge of performance characteristics of materials and components					
	2.6 Buildability review was carried out					
	2.7 Effective participation in supervision and control					
	Do you have any other criteria that should be considered? Please specify below and rank					
	i.					
	ii.					
	Kindly state your reason(s) for choosing the above					
	Criteria					

3. Quality of works	3.1 Aesthetic and quality of design					
	3.2 Good and quality specification was produced					
	3.3 Production of quality management strategies					
	3.4 Assist in the production of quality or as-built Manuals					
	3.5 No rework and deficiency in design					
	3.6 Design conformance to codes and standards					
	3.7 Assist in the production construction inspection and testing program					
	Do you have any other criteria that should be considered? Please specify below and rank					
	i.					
	ii.					
	Kindly state your reason(s) for choosing the above					
	Criteria					
	4.2 Assist in defining project strategy					
	4.3 Involvement of other professionals at design stage					
	4.4 Co-ordination among phases of design					
	4.5 Co-ordination between design and construction					
	4.6 Effective communication of design to contractor					
	4.7 Project review meetings					
	Do you have any other criteria that should be considered? Please specify below and rank					
	i.					
	ii.					
	iii.					
	Kindly state your reason(s) for choosing the above					
	Criteria					

PART FOUR: PERFORMANCE ASSESSMENT

Please assess the level of achievement of your architect on each of the performance criteria in the table below on a five-point scale of 1 to 5, where:
(5)= excellent, (4) = very good (3) = good, (2) = fairly good, (1) = poor

CATEGORY/ GROUP	PERFORMANCE CRITERIA	RATING				
		1	2	3	4	5
1. Client Focus	1.1 Understanding client's cooperate objectives					
	1.2 Forethought and consideration of users' requirements					
	1.3 Identifying and prioritizing project objectives					
	1.4 Analyzing the design concepts and requirements					
	1.5 The project was designed within budget					
	1.6 Completion of design on time					
	1.7 Design conformance to owner's requirement					
2. Buildability of design	2.1 Completion and simplification of design					
	2.2 Standardization elements					
	2.3 Dimensional co-ordination of elements					
	2.4 Flexibility of design for changes					
	2.5 Knowledge of performance characteristics of materials and components					
	2.6 Buildability review was carried out					
	2.7 Effective participation in supervision and control					
3. Quality of works	3.1 Aesthetic and quality of design					
	3.2 Good and quality specification was produced					
	3.3 Production of quality management strategies					
	3.4 Assist in the production of quality or as-built manuals					
	3.5 No rework and deficiency in design					
	3.6 Design conformance to codes and standards					
	3.7 Assist in the production construction inspection and testing program					
4. Management systems	4.1 Pre-design project meetings					
	4.2 Assist in defining project strategy					
	4.3 Involvement of other professionals design at stage					
	4.4 Co-ordination among phases of design					
	4.5 Co-ordination between design and construction					
	4.6 Effective communication of design to contractor					
	4.7 Project review meetings					
5. Others. State and rank	5.1					
	5.2					
	5.3					
	5.4					

PART FIVE: GENERAL COMMENTS

Do you have any other comments as a client on the perception of architects' performance in successful building projects delivery in Ghana?

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Thank you

APPENDIX B:

Table 4.6 : Mann-Whitey U and Wilcoxon tests of mean importance between and public and private building projects

PERFORMANCE CRITERIA	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (two-tailed)
Understanding client's corporate objectives	11.00	45.00	-3.60	0.00
Forethought and consideration of users' requirements	55.00	100.00	-1.10	0.17
Identifying and prioritizing project objectives	51.00	96.00	-1.37	0.07
Analyzing the design concepts and requirements	36.50	88.50	-1.80	0.07
The project was designed within budget	36.50	81.50	-2.29	0.02
Completion of design on time	23.00	68.00	-2.92	0.04
Design conformance to owner's requirements	26.50	71.50	-2.69	0.07
Completion and simplification of design	71.50	207.50	-0.03	0.97
Standardization of elements	63.00	108.00	-0.80	0.42
Dimensional co-ordination of elements	38.50	83.50	-2.02	0.05
Flexibility of design for changes	28.50	73.60	-2.63	0.19
Knowledge of performance characteristics of materials and components	63.00	108.00	-0.68	0.50
Buildability review was carried out	61.50	106.50	-0.69	0.49
Effective participation in supervision and control	41.00	86.00	-2.06	0.04
Aesthetic and quality of design	61.50	197.50	-0.65	0.52
Good and quality specification was produced	59.00	197.00	-0.78	0.44
Production of quality management strategies	61.00	197.00	-0.68	0.50
Assist in the production of quality or as-built manuals	72.00	208.00	0.00	1.00
No rework and deficiency in design	40.00	85.00	-1.95	0.05
Design conformance to codes and standards	67.50	112.50	-0.28	0.78
Assist in the production construction inspection and testing program	49.50	185.50	-1.40	0.16
Pre-design project meetings	67.00	112.00	-0.31	0.76
Assist in defining project strategy	68.50	204.50	-0.22	0.83
Involvement of other professionals at the design stage	41.00	86.00	-1.84	0.07
Co-ordination among phases of design	47.00	92.00	-1.47	0.14
Co-ordination between design and construction	36.00	81.00	-2.23	0.03
Effective communication of design to contractor	70.50	115.50	-0.10	0.92
Project review meetings	54.00	190.00	-1.07	0.29

Note: Criteria in italics show that there are mean differences between both sectors

APPENDIX C:

Table 4.7 : Mann-Whitey U and Wilcoxon tests of mean achievement between public and private building projects

PERFORMANCE CRITERIA	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (two-tailed)
Understanding client's corporate objectives	8.40	36.00	-4.29	0.03
Forethought and consideration of users' requirements	9.00	45.00	-3.90	0.02
Identifying and prioritizing project objectives	58.50	94.50	-1.29	0.20
Analyzing the design concepts and requirements	72.00	108.00	-0.68	0.50
The project was designed within budget	55.00	91.00	-1.54	0.12
Completion of design on time	61.00	97.00	-1.19	0.23
Design conformance to owner's requirements	82.50	313.50	-0.08	0.93
Completion and simplification of design	16.00	52.00	-3.73	0.00
Standardization of elements	80.50	311.50	-0.19	0.85
Dimensional co-ordination of elements	19.50	55.50	-3.49	0.00
Flexibility of design for changes	70.00	106.00	-0.85	0.40
Knowledge of performance characteristics of materials and components	66.00	297.00	-1.01	0.31
Buildability review was carried out	19.00	55.00	-3.41	0.01
Effective participation in supervision and control	16.00	52.00	-3.54	0.00
Aesthetic and quality of design	24.00	60.00	-3.19	0.01
Good and quality specification was produced	4.50	40.50	-4.15	0.00
Production of quality management strategies	3.70	36.00	-4.30	0.00
Assist in the production of quality or as-built manuals	1.50	37.50	-4.19	0.00
No rework and deficiency in design	2.80	36.00	-4.32	0.00
Design conformance to codes and standards	21.00	57.00	-3.33	0.01
Assist in the production construction inspection and testing program	16.00	52.00	-3.67	0.00
Pre-design project meetings	28.00	64.00	-2.94	0.03
Assist in defining project strategy	28.00	64.00	-3.11	0.02
Involvement of other professionals at the design stage	24.00	60.00	-3.18	0.01
Co-ordination among phases of design	28.00	64.00	-3.07	0.20
Co-ordination between design and construction	68.00	104.00	-0.85	0.40
Effective communication of design to contractor	36.00	72.00	-2.44	0.02
Project review meetings	8.00	44.00	-4.17	0.01

Note: Criteria in italics show that there are mean differences between both sectors

APPENDIX D:

Table 4.8 : Mann-Whitey U and Wilcoxon tests of mean performance between private and public building projects

PERFORMANCE CRITERIA	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (two-tailed)
Understanding client's corporate objectives	16.00	65.40	-3.61	0.21
Forethought and consideration of users' requirements	14.00	70.00	-1.51	0.13
Identifying and prioritizing project objectives	6.00	79.00	-2.09	0.04
Analyzing the design concepts and requirements	17.00	52.00	-0.95	0.34
The project was designed within budget	15.5	75.00	-2.18	0.08
Completion of design on time	17.00	78.5	-2.63	0.18
Design conformance to owner's requirements	9.00	87.00	-0.57	0.57
Completion and simplification of design	12.80	77.20	-0.32	0.75
Standardization of elements	13.5	86.60	-0.13	0.90
Dimensional co-ordination of elements	10.50	44.00	-0.20	0.85
Flexibility of design for changes	15.5	75.00	-2.18	0.08
Knowledge of performance characteristics of materials and components	11.5	89.50	-0.11	0.92
Buildability review was carried out	16.00	81.00	-2.23	0.23
Effective participation in supervision and control	14.70	89.00	-0.23	0.82
Aesthetic and quality of design	10.50	87.00	-0.60	0.55
Good and quality specification was produced	13.00	66.50	-1.91	0.60
Production of quality management strategies	15.00	70.00	-1.39	0.17
Assist in the production of quality or as-built manuals	17.00	79.5	-1.82	0.41
No rework and deficiency in design	12.00	89.00	-0.48	0.84
Design conformance to codes and standards	10.50	84.50	-1.40	0.16
Assist in the production construction inspection and testing program	14.00	72.5	-0.21	0.82
Pre-design project meetings	18.00	86.00	-0.82	0.41
Assist in defining project strategy	18.5	86.5	-0.73	0.47
Involvement of other professionals at the design stage	18.60	90.00	-2.28	0.57
Co-ordination among phases of design	12.00	83.00	-1.24	0.96
Co-ordination between design and construction	11.00	64.00	-0.24	0.83
Effective communication of design to contractor	9.50	56.50	-1.02	0.31
Project review meetings	14.50	68.00	-1.19	0.28

Note: Criteria in italics show that there are mean differences between both sectors