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CONSTRUCTION PROFESSIONALS PERSPECTIVE ON THE CRITERIA FOR RATING CONTRACTOR PERFORMANCE IN THE GHANAIAN CONSTRUCTION INDUSTRY

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ABSTRACT

Performance measurement is the regular measurement of the results and efficiency of services or programmes. In recent past, it has become vital to the achieving of business and organizational goals worldwide. Indeed, previous studies internationally have indicated that the development of a set of measurable criteria is key to any performance measurement system. In the absence of any empirical data for legitimizing performance measurement, this study provides a framework for the Ghanaian construction industry within which contractors' performance could be measured by means of a set of criteria. A survey was conducted in Ghana among consultants to identify a set of performance criteria that would be relevant and applicable to the Ghanaian Construction Industry. In all, 65 respondents completed the questionnaire.

The data obtained was analyzed, that is, ranking the variables using One Sample T-test with the help of Statistical Package for the Social Sciences (SPSS) Software. The findings suggest that 10 out of 20 criteria identified from the literature could be utilized for the proposed framework for performance measurement of contractors in Ghana. The 10 criteria were quality of final building product, standard of workmanship, site management practices, labour relations at site, relations with subcontractors and statutory authority, appropriateness of organizational structure, employee development, client satisfaction, equipment holding and financial stability.

It is expected that the findings of the study could be used as the foundation for developing a performance rating mechanism for assessing the performance of Ghanaian contractors.

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DEDICATION

This thesis is dedicated to my wife, son and all my family members.

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GENERAL INTRODUCTION

1.0 INTRODUCTION

Chapter one, which gives an overview of the research with regards to the background of the study and problem statement of the research are presented. In furtherance, the aim and objectives of the study are presented followed by a summary of the research methodology adopted. The chapter is then concluded with highlights of the organization of the study.

1.1 BACKGROUND TO THE RESEARCH

The importance of indentifying contractor performance is evident throughout the markets worldwide, the results of which are to attract high calibre employees (Kagioglou, Cooper & Aouad, 2000). In this regard, it becomes imperative to access means of measuring and making it evident contractor performance to the market at large. This means that in measuring contractor performance, the set of criteria used should be appreciated by potential customers, employees and investors.

In Ghana, the construction industry plays an essential role in the socio- economic development of the country, since in 2006 and 2007, the industry contributed 0.7% and 1.0% respectively to Gross Domestic Product (GDP) (ISSER, 2007). The activities of the industry have great significance to the achievement of national socio-economic goals of providing infrastructure, sanctuary and employment (Owusu-Sechere, 2008) It includes hospitals, schools, townships, offices, houses and other buildings; urban infrastructure (including water supply, sewage, drainage) highways, roads, ports, railways, airports, power systems, irrigation

and agricultural systems, telecommunications etc. The industry deals with all economic activities directed to the creation, renovation, repair or extension of fixed assets in the form of buildings, land and improvement of an engineering nature (Frimpong- Manso, 2008). Although, figures are not readily available, the industry generates substantial employment to unskilled, semi-skilled and skilled work force and provides a growth impetus to other sections of the economy (Owusu Tawiah, 1999). It is essential therefore, that, this vital activity is nurtured for the healthy growth of the economy.

Although, the significance of the industry in terms of contribution to the assets and employment are well recognized, there have been constant criticisms of the performance of the major players, especially contractors. These criticisms have in the recent past led to a number of studies that focused on assessing the factors affecting contractor performance. (Owusu Tawiah, 1999) identified two critical factors affecting Ghanaian owned construction firms. The two factors were financial and managerial factors. Under the financial factors, bureaucratic payment procedures, access to capital, obtaining interim payments among others constituted critical financial factors confronting Ghanaian owned construction firms. Again, under the managerial factors, poor accounting and financial management, materials control on site, theft and fraud by own employees, project planning, site management and lack of technical expertise among others constituted critical managerial factors confronting Ghanaian owned construction firms. Other studies conducted by (Boateng 2008, Danso 2008, Mensah 2008, Odei 2008, Frimpong-Manso 2008, Owusu-Sechere 2008 and Osei-Owusu 2008) identified some factors affecting the performance of the various classes of both building and civil engineering contractors in executing construction projects in Ghana. The factors were

cost, time, and quality among others. These go to support other research studies conducted internationally (Xiao and Proverbs, 2003).

Notwithstanding the significance of the above studies, the Government of Ghana through the Ministry of Finance and Economic Planning (MOFEP) recently set up a five person task force to submit recommendations that would subsequently help to improve upon the general performance of the construction industry (Taskforce Report, 2007). Between January, 2008 and March 2008, the Taskforce supported by staff from MOFEP held about eight awareness meetings with industry stakeholders like consultants, client organizations, contractor associations, etc in both the northern and southern sectors of the country. Notably amongst the concerns expressed at the stakeholders' awareness meetings was the quality of performance and negative perceptions of the Ghanaian contractor (Taskforce Report, 2007). Again, there is the belief that without the involvement of the foreign contractors the development of the country's infrastructure cannot be well executed (Taskforce Report, 2007).

To this effect, the Taskforce, in its report proposed a lot of recommendations to help improve the general performance of the industry. It was evident in their recommendations that the introduction of a contractor performance rating mechanism of the Ghanaian construction industry was overdue. In their view major stakeholders stood to benefit from the introduction of this rating mechanism in that it will help provide an objective and consistent means to assess contractor performance. Again it will help institute improvement measures that would lead to an increase in quality of work, cost effectiveness, and efficiency of operations to mention but few. Thus, this study is based on the argument that to help improve the quality

of performance and erase the negative perceptions of the Ghanaian contractor, there is the need for performance measurement to be critically assessed and a framework provided, within which a set of performance criteria can be applied.

1.2 STATEMENT OF THE PROBLEM

From the background information presented, it is evident that the importance of the construction industry to the Ghanaian economy is very immense. The Ghanaian contractor generally, has been perceived as inefficient, that is, the Ghanaian contractor lacks managerial skills and has limited technical know-how. (The Ghanaian Times, Thursday, 12 March, 2009, pg. 9). The Ghanaian contractor has also been accused of not been able to deliver completed projects to specifications and quality standards. These remarks sometimes go to the extent to say that foreign contractors using only Ghanaian artisans and materials perform better than their Ghanaian counterparts. While these concerns may be valid, they are often based on the perceptions of the people making these claims and could be described as anecdotal. With these concerns one may ask, what basis can be used to objectively compare the output of contractors?

It is to answer some of these questions that there is the need to propose a framework within which an objective assessment of what constitutes a good or acceptable performance by contractors in the construction industry can be made and legitimized.

1.3 RESEARCH QUESTION.

The study and the setting of objectives are based on the following research questions:

- Does the Ghanaian construction industry have a framework within which an objective assessment of performance is undertaken?
- How should the performance of Ghanaian contractors be judged?
- What should be the criteria for assessing the performance of Ghanaian contractors?

1.4 AIM OF THE STUDY

The aim of the study is to identify a set of criteria that would be applicable in rating the Ghanaian contractor's performance within the proposed framework.

1.5 OBJECTIVES OF STUDY

The specific objectives of the study are:

- To develop a theoretical framework for assessing the performance of contractors in Ghana.
- To develop an appropriate research instrument to elicit data on contractor performance from Ghanaian construction professionals.
- To analyze the data on contractor performance using One Sample T-test statistical analysis with the help of SPSS.
- Based on the findings, propose a set of criteria that could be used as a foundation for developing an appropriate performance measurement framework.

1.6 RESEARCH METHODOLOGY ADOPTED

Initially, there was a thorough search for literature with the aim of having a better understanding of recent developments in the area of performance measurement. The literature on performance measurement framework proved helpful in identifying an appropriate

theoretical framework for the study. In furtherance, efforts were made to review many of the performance rating systems available in the industry in general. Aspects of these systems were reviewed to include applicable criteria that could be used in the assessment.

Subsequently, structured questionnaires were used in obtaining data (including piloting). This provided opportunity for professionals in the construction industry to identify criteria that they considered very important and applicable in the assessment of contractors in the industry. Again, this information provided some form of prioritization of the criteria. The data received were analyzed using One Sample T-test statistical analysis with the help of the Statistical Package for the Social Sciences (SPSS) software.

1.7 ORGANISATION OF THE DISSERTATION

The dissertation is organized into six chapters as follows:

Chapter one is devoted to the general introduction of the study, problem statement, aims and objectives of the research and research methodology adopted.

Chapter two is devoted to the literature search and touches on a review of performance measurement in the construction industry generally, definition of terms, importance of performance measurement, performance indicators and key features of performance measurement systems, performance measurement in the Ghanaian construction industry. The chapter is summarized with identification of a set of criteria for rating contractor performance.

Chapter three is devoted to the development of a theoretical framework for the study including a conceptual model.

Chapter four elaborates on the research methodology employed and the statistical methods and software used in collecting and analyzing the data.

Chapter five contains the analysis of data collected, discussion and comments on the findings.

Chapter six is devoted to conclusions of the study and recommendations based on the findings of the study.

1.8 SUMMARY

The background of the study including the problem statement, aim and objectives and research methodology have been presented. The next chapter which is chapter two presents a review of performance measurement in the construction industry generally.

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CHAPTER 2

A REVIEW OF CONTRACTOR PERFORMANCE MEASUREMENT IN THE CONSTRUCTION INDUSTRY

2.0 INTRODUCTION

This chapter discusses the literature review. The review has been divided into two (2) main sections.

The first section deals with a review of performance measurement in the construction industry generally, including providing a working understanding relating to the definition of terms performance, performance measures and performance indicators within the scope of the research. What constitutes a good performance measurement system and its importance is also highlighted. Among others, the use of performance measures for benchmarking, productivity measurement, project success and ratings are discussed. Thereafter, readers are introduced to the features of some of the major performance measurement systems in the construction industry generally.

The second section of the review deals with the historical development of the construction industry in Ghana and the importance of the industry to the economy of Ghana. This would be followed by a review of studies undertaken by other researchers on contractor performance in the Ghanaian Construction Industry.

2.1 PERFORMANCE MEASUREMENT IN THE CONSTRUCTION INDUSTRY GENERALLY

From the background to the research, the construction industry is an important part of every economy and that performance measurement holds the key to its achievement of national socio-economic goals. In the construction industry's present scenario, the systematic ways of performance measurement have influenced many construction firms, government sectors, public and private clients and other project stakeholders (Takim, 2003). Performance measurement has been used in collecting and reporting information about inputs, efficiency and effectiveness of construction projects. Again, construction firms use performance measurement to judge their project performances, both in terms of the financial and non-financial aspects and to compare and contrast the performance with others in order to improve programme efficiency and effectiveness in their organizations (Kagioglou et al. 2000). Moreover, according to (Steven et al. 1996), performance measurements are needed to tract, forecast and ultimately control those variables that are important to the success of a project, and this has been agreed by many researchers and practitioners (Sinclair and Zairi, 1995; Mbugua et al., 1999; Love et al., 2000 and Chan, 2001).

Ward et al. (1991) has mentioned that in assessing the performance of contractors, 'a common approach is to evaluate performance on the extent to which client objectives like cost, time and quality were achieved'. On the international scene, especially in the well advanced countries such as the UK, USA and Japan those are seen as the three traditional indicators of performance (Moshsini and Davidson, (1992). These traditional measures have become so popular and entrenched due to the objectivity and simplicity surrounding their measurement. Again, in today's construction environment, timely completion within budgetary allocations

are highlighted as critical to client requirement in order to attain 'first in the market' advantage over competitors (Kog et al., 1999). However, the 'three measures' provide an indication as to the success or failure of a project, but do not in isolation, provide a balanced view of the performance measurement. Furthermore, their implementation in construction projects is apparent at the end of the project, and therefore, they can be classified as 'lagging' (i.e. wait till project completion) rather than 'leading' indicators of performance.

Indeed, Ward et al (1991) has suggested that 'looking back on the conduct of a project, what sticks in the mind is often not so much financial success or early completion, but memories of other people involved and abiding impressions of harmony, goodwill and trust or, conversely, of argument, distrust and conflict'. The Client's willingness to pursue a given procurement route to achieve a future project is likely to be strongly influenced by these factors. Therefore, it is clear that the traditional measures of assessing the performance of contractors, though very significant, are not sufficient to assess their performance.

(Kagioglou et al, 2000) also concur that the methods used to measure performance in construction projects fall into three main categories:

1. Financial Perspectives: That is, how do the project's financial stakeholders view the project? For example, use of cash flow and cost benefit analysis;
2. The internal business process perspective: That is, how are we performing in our key process activities? For example, use of critical path analysis.
3. The customer perspective: That is, how do our existing and potential customers see it?

Furthermore, (Kagioglou et al., 2000) identified some limitations in the three main categories above in that the participants in construction projects, where the aim is to find methods for measuring and managing performance that can be consistently applied to the set of project participants. Again, the categories lack validation from extensive empirical evidence to form the basis for effective performance measurement for organization.

During the 1990's there has been some interest in 'emerging' techniques and philosophies to measure and manage performance, such as total quality management (TQM), benchmarking, business process re-engineering (BPR) and business process management, that have shifted the focus from 'lagging' towards 'leading' indicators of performance. The majority of these concepts have been imported into construction from manufacturing industry; (see e.g. Koskela, 1992, Mohamed, 1995, and Kagioglou et al 1998). These techniques have tended to concentrate on construction productivity and those factors that influence it (Motwani et al; 1995), with the aim of achieving continuous improvement through the 'leading' indicators of performance.

For example, the Integrated Performance Index (Pillai et al., 2002) in India was developed for performance measurement of R&D projects, based on their real-life experiences of working on the management system for the Integrated Guided Missile Development Programme of India. The usefulness of the integrated performance index is that it can be applied at all phases of the project life cycle to rank the project for selection, to compare project performance under the execution phase and to act as an input for the management of future projects. Another example is the Quality Assessment System in Constructions (QLASSIC) model developed by the Construction Industry Development Board of Malaysia to assess the contractor's

performance in terms of quality of the finished product (CIDB Malaysia, 2001). Some few years ago the UK construction best practice programme (cbpp) launched the 'key performance indicators' (KPIs) for construction. This was to create an industry-wide performance measurement system to enable good companies to demonstrate their abilities and allow clients to select contractors and consultants on the basis of reliable data (Bprc, 1999). These KPI's give information on the range of performance being achieved in all construction activities and they include the following:

1. Client satisfaction – product
2. Client satisfaction – service
3. Defects
4. Predictability – cost
5. Predictability – time
6. Profitability
7. Productivity
8. Safety
9. Construction Cost
10. Construction Time.

These KPIs are intended for use as benchmarking indicators for the whole industry, whereby an organization can benchmark itself against the national performance of the industry and identify areas for improvement, that is, where they perform badly. Further discussion on the above KPIs would be presented under the discussion on performance measurement systems.

2.1.1 Defining Performance Measurement

Judging from the preamble presented so far, it is evident that the criteria cost, time and quality are in no doubt the foundation of performance measurement systems. In theory, performance measurement appears to be one of those "suitcase words (Bourguignon, 1995) in which everyone places the concepts that suit them, letting the context take care of the definition". For example, Max Moullin defined performance measurement as "evaluating how well organizations are managed and the value they deliver for customers and other stakeholders". Alternatively, (Adams 2002, Kennerley 2002 and Neely 2002) defined performance measurement as "the process of quantifying the efficiency and effectiveness of past action". Again, (Hatry, 2006) defined performance measurement as the "regular measurement of the result (outcomes) and efficiency of services or programmes". While these definitions provide an understanding of the performance measurement concept each one of the definitions above also has its own limitations. For example, Moullin's definition is fine if we want to define what performance evaluation is but not appropriate if our purpose is to define performance measurement. The reason is that, as it happens with other processes, the purpose of performance measurement is regular assessment, which suggests that if we want to manage for results through managing measures, then, we should consider performance measurement not just as a rear-view mirror to evaluate our past performance but as a tool to support day to day decision making process.

For the purposes of this study or research, the definition of performance measurement as given by (Takim et al., 2003) would be adopted. Takim defined performance measurement as the "regular collecting and reporting of information about the inputs, efficiency and effectiveness of construction projects". The definition provides the opportunity for a day to

day decision to be taken concerning the efficiency and effectiveness of the inputs applied which is a vital component of any effort at managing for results.

2.1.1.1 Performance Measures and Performance Indicators

Before any effective performance measurement can be undertaken there is the need to develop an objective and consistent measureable criteria. Previous studies have classified these measurable criteria into performance measures and indicators. This section seeks to describe both.

[Mbugua et al, (1999); Love et al (2001)] have identified a distinction between performance indicators; performance measures and performance measurement. According to (Mbugua et al 1999) performance indicators specify the measurable evidence necessary to prove that a planned effort has achieved the desired result. In other words, when indicators can be measured with some degree of precision and without ambiguity they are called measures. However, when it is not possible to obtain a precise measurement they are usually referred to as performance indicators.

On the other hand, Performance measures are the numerical or quantitative indicators [Sinclair and Zairi, (1995)] and performance measurement is a systematic way of evaluating the inputs and outputs in manufacturing operations or construction activity and acts as a tool for continuous improvements [(Sinclair and Zairi, (1995); Mbugua et al (1991)]. In response to calls for continuous improvement in performance, many performance measurement measures have emerged in management literature. Some examples include the financial measures (Kangari et al., 1992; Kay, 1993), client satisfaction measures (Kometa, 1995;

Chinyio et al., 1998), Employee measures (Bititci, 1994; Shan and Murphy, 1995), Industry measures (Latham, 1994; Egan, 1998).

Again, (Cordero, 1990) also classifies performance measurements based on the method of measurement and areas of measurement. The methods of performance measurement can be in terms of the technical performance, the commercial performance and the overall performance. Furthermore, he proposes a model of performance measurement in terms of output and resources to be measured at different levels. Outputs are measured to determine whether they help to accomplish objectives and resources are measured to determine whether a minimum amount of resources is used in the production of outputs. However, in his model, Cordero failed to reflect the interest of stakeholders, their needs and expectation. That is, if construction organizations are to remain competitive in the long run, they need to develop and better understand their relations with their customers, suppliers, employees, lenders and the wider community as suggested by Love et al., 2000.

Hence, performance measurement has to incorporate the interest of the stakeholders. In addition, Love et al., (2000) proposed a model known as Stakeholders Perspective Measurement (SPM) that adequately considers relations with customers, suppliers, employees, financiers and the wider community. In Zavadskas and Kaklauskas, (1996) bid to determine who an efficient contractor is, identified estimated cost of project, duration of construction, quality of final building product, standard of workmanship, ability to formulate practical programmes, employee development relations, with sub-contractors and statutory authorities, degree of co-operation with stakeholders among others as criteria for determining efficient contractor.

Furthermore, (Xiao and Proverbs, 2003) defined overall contractor performance to embrace construction cost, construction time, construction quality and sustainable development, the philosophy being that the achievement of one aspect of performance should not be at the expense of another. Table 2.1 below shows the indicators of overall contractor performance as suggested by Xiao and Proverbs.

Table 2.1 – Indicators of overall contractor performance

Aspect	**Performance Indicator**
Cost	Construction Cost Cost Certainty Client satisfaction on cost
Time	Construction Time Time Certainty Client satisfaction on time
Quality	Defects Liability Period Client satisfaction on Cost
Sustainable Development	Profitability Partnership Investment in R & D and training Environment Protection Health and Safety

Source: (Xiao and Proverbs, 2003)

2.1.2 What Constitutes a Good Performance Measurement System?

If the right things are not measured or measured accurately, those using the data will be misled and bad decisions are likely to follow. As the old saying puts it: garbage in, garbage out. Flint (2005) highlighted on the following as some of the characteristics of a good performance measurement system:

(a) It should be results oriented i.e. focused primarily on desired outcomes, less on outputs;

(b) It should be reliable i.e. accurate, consistent information over time;

(c) It should provide useful information that is valuable to both policy and programme decision-makers and also provide feedback on performance.

(d) The measures should be quantitative i.e. expressed in terms of numbers or percentages;

(e) The measures should be easy to interpret i.e. do not require an advanced degree in statistics to use and understand;

(f) The measures should be credible i.e. users have confidence in the validity of the data;

(g) It should be comparable such that it can be used to benchmark against other organizations internally and externally;

(h) It should be realistic such that the measures set can be calculated.

The above characteristics imply that as the study seeks to develop some performance measurement criteria for the Ghanaian Construction Industry, the criteria should provide an objective, reliable and consistent means of measuring contractor performance. Again, the criteria to be adopted should embrace all the above characteristics.

2.1.3 Importance of Performance Measurement

Osborne and Gaebler, 2005, mentioned that failure to measure results means that a distinction cannot be made between success and failure, and if success is not appreciated, it cannot be rewarded. This means that, if success is not rewarded, then, probably failure is being rewarded and the inability to recognize failure means it cannot be corrected. But if results can be demonstrated, then, improvement can be achieved.

A major use of performance measurement is to establish accountability so that stakeholders in the construction industry can assess what programmes have been achieved with the funds provided (Neely, 2002). Another major use is to help stakeholders develop and then justify budget proposals i.e. supports strategic planning and goal-setting. Performance measurement also helps or assists stakeholders in determining effective use of resources (Neely, 2002).

Public and private managers often say that performance information will not help them because their problem is too few resources to do what needs to be done. Yet managers need performance measurement to enhance their decision making process as how to increase their ability to get the job done with whatever resources they have. Performance measurement also assists in the improvement of customer service (Hatry, 2006). Again, according to (Greiner, 2007), performance measurement gives a basis for rating the outcomes and competitiveness of programmes or activities.

The importance of performance measurement in the construction industry is believed to accrue to the major stakeholders in the industry, that is, the client, consultant and the contractor (Nassar, 2009). To the client, Nassar mentioned that best value for money will be achieved since the project stands the chance of being delivered on schedule to and to quality standards as spelt out in the specifications. Also, performance measurement provides the client with an objective and consistent means of implementing pre-qualification process since performance information of different contractors would be available for comparison and selection.

To the consultant, Nassar mentioned that performance measurement will help the consultant to know specific areas of the contractor's performance to focus during construction supervision to ensure a smooth implementation of the project. Also, it will provide the consultant with reliable, accurate and consistent means to assess contractor performance

To the contractor, Nassar again mentioned that performance measurement will provide the contractor with an objective assessment of performance with strength and weaknesses pointed out. Also, the contractor will know which areas need strengthening in order to improve performance. Furthermore, performance measurement will help the contractor to institute improvement measures which will lead to an increase in quality of work, cost effectiveness and efficiency of operations. Performance measurement has also assisted in productivity measurement and benchmarking (Alfeld, 1988, Alarcon et al, 2001).

2.1.4 Productivity Measurement

To be able to assess whether progress is been made in the construction process it is important to make reference to the results as a change in productivity for the activity being measured. A classical definition of productivity is a comparison of the output of a production process to its corresponding input i.e. the output to input ratio (Thomas and Matthews, 1996). However, productivity measurement and performance measurement are two separate management functions. Productivity measurement involves the collection of information about various activities – specifically, work in place and the corresponding work-hours over a given period of time. On the other hand, performance measurement involves a more comprehensive analysis of these same factors to compare budgeted as against results; hence, productivity is just one part of performance (Thomas and Kramer, 1988).

Broadly, productivity measures can be classified as single factor productivity and total factor productivity. Single factor productivity is the measure of an output to a single measure of input such as labour while total factor productivity measures the output produced to a bundle of inputs such as labour and capital together.

Although, performance measurement and productivity measurement are separate management functions, the objective of the two is for organizations to focus attention on the use of resources by measuring how productive they have been and finding ways to optimize resource use and further increase efficiency in their operations, while maintaining or improving results.

2.1.5 Benchmarking

Benchmarking through the application of performance measurement systems has in recent times become a total issue in the construction industry (Ahadzie et al, 2005, Proverbs et al, 2005). The Construction Industry Institute (CII), (2003) quoting from the European Benchmarking Code of Conduct defines benchmarking as:

> *"Supply making comparisons within other organizations and then learning the lessons that those comparisons throw up".*

Benchmarking has generated a new philosophy and thinking in the understanding and use of parameters for assessing project success and also improving performance and the performance management of future projects (See for instance Kagioglou et al, 2001). (Costa et al., 2004) has attributed this new philosophy and thinking to the fact that benchmarking has become an integral part of the planning and on-going review process to ensure a focus on the external environment and to strengthen the use of factual information in developing plans.

Consequently, work has been reported on the introduction of Key Performance Indicators (KPIs) and the development of Performance Measurement Systems(PMS) for benchmarking in different countries such as India, Brazil, UK, USA, Malaysia, Chile and Hong Kong (See Takim et al, 2003; Costa et al, 2004). Indeed the use of KPIs and the setting of benchmarks have been described as the mechanism for implementing the Egan Agenda (1998) for a radical improvement in the UK Construction Industry (Kaluarachi and Jones, 2004). Similarly, the initiative developed by both industry representatives and Construction Industry Institute (CII) staff is aimed at helping construction companies to measure and enhance their performance in the US (CII, 2003; Takim et al, 2003; Costa et al, 2004, Ahadzie et al, 2005). In Malaysia, the initiative has been led by the Construction Industry Development Board (CIRB) to improve the performance of contractors. Costa et al (2004) reports of other such benchmarking initiations in Australia and Denmark.

The practical implication of benchmarking is that, it provides a means of comparing and measuring the organization of performance against other similar organizations in key business activities, and then using lessons learned from the best to make target improvements [KPI, (2000)]. Thus, PMS for benchmarking is widely recognized as the key to construction industry development at company, national and international levels.

2.1.6 Project Success

It is not uncommon to hear organizations and individuals talking about the various successes that they have achieved. But someone may ask what is success and what criteria should

organizations use to measure success? The discussion below will seek to define project success criteria, ascertain their difference with success factors and assess their importance in performance measurement.

Project success seems to be one of the unclear project management concepts. Individuals or project teams executing a project have different needs and expectations. Therefore it is not strange to find them construe project success in their own way of understanding (Cleland and Ireland, 2004). "For those involve with a project, project success is normally taught of as achievement of some pre-determined project goals (Lim & Mohammed, 1994) while the public had different opinions usually founded on user satisfaction. A typical example is the Sydney Opera House Project (Thomsett, 2002), which exceeded its budget and duration 16 times and 4 times respectively than originally planned. But the final impression that the project made was very enormous that nobody recollect the original missed goals. In the opinion of the public the project was a success but from the project management perspective, it was a failure. On the contrary, the Millennium Dome in London was a project completed on schedule and within budget but the public viewed it as a failure since its final impact could not be felt (Cammack, 2005).

"In the same way that quality requires both conformance to the specification and fitness for use, project success requires a combination of product success (service, result or outcome) and project management success "(Duncan, 2004).

For many people it is still unclear the distinction between criteria and factors. The Cambridge Advanced Learner's Dictionary describes the criterion as "a standard by which you judge,

decide about or deal with something" while a factor is explained as "a fact or situation which influences the result of something". (Lim & Mohammed, 1999) applied those definitions to project success and emphasized that critical factors can lead to a series of events that would in the end meet the overall success criteria of the project, so they should not be used as synonymous terms.

2.1.6.1 Success Criteria

Traditional success criteria have been an integrated part of project management theory given that every definition of project management included the so called 'Iron Triangle' success criteria – cost, time and quality (Atkinson, 1999).

Atkinson continues that "as a discipline, project management has not really changed or developed the success measurement criteria in almost 50 years". To promote the modernization of out of date success criteria, he suggest the 'Square Route' success criteria instead of the 'Iron Triangle'. The main difference between the two is the inclusion of qualitative objectives rather than quantitative, which are the benefits that different group of people stand to gain from the project. These benefits are two dimensional i.e. the organizational view and the stakeholders view. An example is where an organization can make profit through achieving strategic goals when a project is completed and at the same time these goals have a serious environmental impact in the stakeholder's community (Litsikakis, 2009). This means that a successful project must bargain between the benefit of the organization and the satisfaction of end-users.

A more structured approach to project success is grouping the criteria into categories. (Wideman, 1996) describes four groups, all of them time independent: “internal project objectives (efficiency during the project), benefit to customer (effectiveness in the short term), direct contribution (in the medium term) and future opportunity (in the long term)”. He goes further to say that the characterization of ‘time independent’ is based on the fact that success varies with time. Looking at the future benefit of the organization can be really difficult, because in some cases they do not even know what they want, yet it is vital to know what the project is trying to achieve after the completion time so that success criteria are clearly defined in the early stages (Litsikakis, 2009). This is quite a different approach, because the focus moves from the present success criteria to the future, in a way that a project can be unsuccessful during execution if it is judged by criteria like cost and quality, but in the long term it can turn to be a thriving story. A good example of this hypothesis is hosting the Olympic Games in Athens, Greece, which received mass criticism both during the planning period, due to the delays in construction time, and when it was finished, due to huge cost. But the benefit that Greece will gain from the Olympic Games can be fully understood after five or maybe ten years from the hosting year (Athens2004.com).

All the above success criteria “should be simple and attainable and once defined they should also be ranked according to priority “(Right Track Associates, 2003). A measurable criterion is easy to understand by everyone involved in the project therefore commitment is guaranteed. Unrealistic criteria can put a ‘failure’ label on many projects because of the unreachable standards, can generate low team esteem and team performance in future projects and finally generate unfair disappointment amount stakeholders. As for priority issues it is inevitable that things will go wrong and the project manager would be in a tough situation where he must

make the right decision having in mind that he has to sacrifice the least important success criterion.

2.1.6.2 Success factors

Cooke-Davies, 2002 mentioned that "success factors are those inputs to the management system that lead directly or indirectly to the success of the project or business". Some project managers "intuitively and informally determine their own success factors. However, if these factors are not explicitly identified and recorded, they will not become part of formal project management reporting process nor they become part of the historical project data" (Rad & Levin, 2002). (Belassi & Tukel, 1996) categorized these factors into five distinct groups according to which element they relate:

a) The Project Manager

The appointment of a project manager does not promise a success of a project. The project manager should possess some skills that he can put at the disposal of the project and the project team in order to achieve all objectives. In the 2001 CHAOS report (the Standish Group International, 2001), business, communication, responsiveness, process, results, operational, realism, and technological skills are mentioned as some of the most important skills a project manager should have to deliver success. However, more recent research by (Turner & Muller, 2005) has concluded that "the leadership style and competence of the project manager have no impact on project success". It is very interesting to investigate why a highly respectable professional body for project managers published such a contradictive position. A possible answer could be found in the fact that project managers results are difficult to prove and even more difficult to measure. If the project is successful, senior

management would probably claim that all external factors were favourable. If it turns to be a failure, the project manager easily becomes the scapegoat.

b) The project team

Project managers are very lucky if they have the option to choose their project team. More often, their team is inherited to the project from various sectors of the organization. It is vital to have a good project team to work with, with core skills that can be evolved to core competencies and capabilities for the whole organization. All members of the project team must be committed to the success of the project and the overall mission of the company. Apart from their skills and commitment, project team members should have clear communication channels to access "both the functional and the project manger within a matrix organization. Effective management of this dual reporting is often a critical success factor for the project" (PMBOK Guide, 2004).

c) The Project Itself

The type of project underlines some factors that are important to success. For example if a project is urgent, the critical factor in that case is time. The Wembley Stadium was suspected to be fully operational due to May's 2006 FA Cup Final and that is the primary target. However, the increase of cost "that has thrown the management calculation out of kilter" (Evans, 2005) was not a big issue at that time. The size, value of a project and its uniqueness of activities can be a puzzle for the project manager who is used to planning and coordinating common and simple activities (Belassi & Tukel, 1996).

d) The Organization

Top management support is the principal success factor for many independent research groups (Tukel & Rom, 1998, CHAOS Report 2001, Cleland & Ireland, 2002; Tinnirello, 2002), which means that no project can finish successfully unless the project manager secures true support from the senior or operational management. It is extremely difficult to work in a hostile environment where nobody understands the benefits that the project will deliver to the organization. "Stakeholders management and contract strategies (number of and size of the contract, interface between the different contract and the management of contract) are separate success factors which are also considered part of organization issues" (Torp, Austeng & Mengesha, 2004).

e) The External Environment

External environment can be the political, economic, socio-culture and technological (PEST) context in which the project is executed. Factors like the weather, work accident, or the government's favourable or unfavourable legislation can affect the project in all its phases. "note that if a client is from outside the organization, he should also be considered as an external factor influencing the project performance" (Belassi & Tukel, 1996). Competitors should also be accounted as external factors which can undermine project success because the original project could be overshadowed by a more glamorous and successful project launched by another organization.

The above discussions reveal that understanding what stakeholders consider as success criteria is very important before a project commences. Success criteria have changed considerably through time and moved from the classic iron triangle's views of time, cost and quality to a

broader framework which includes benefit for the organization and user satisfaction. It is also vital to remember that success criteria are the standards by which a project will be judged, while success factors are the facts that shape the results of project.

In relating the above to rating contractor performance, it means that not every factor that influences performance can be viewed as a criterion for rating performance. Therefore, an early and clearly defined success criterion can ensure an undisputed view of how the performance of contractor will be judged.

2.1.7 What is Performance Rating?

Before proceeding to define performance rating it is necessary to look at the definitions of the two words.

(a) Performance

Everybody has an idea of what the term **PERFORMANCE** means. It is however very difficult to define. It is sometimes used to describe the manner in which something is done, how effectively somebody does a job or something that is carried out or accomplished. Two key definitions that suited to our purposes are:

1. "Performance is the calculation of achievement used to measure and manage project quality." (Source: Project Management Book of Knowledge: Glossary of Terms. PMI 1987).
2. "Performance is the degree to which a development intervention or a development partner operates according to specific criteria/standards/guidelines or achieves results in accordance with stated goals or plans. (Source: A guide for Project M & E: Glossary of M & E Concepts and Terms).

From these two definitions, it is evident that performance involves carrying out a task, the progress of which can be measured and compared using a set of stated requirements. These requirements when fully met make a product or an output satisfy set or stated needs.

(b) Rating

From (www.answer.com), a lot of definitions have been given with respect to rating. For example:

1. Rating is a position assigned on a scale
2. Rating is the evaluation of the financial status of a business or person.
3. Rating is a specified performance limit as of capacity, range or operational capability.

For the purposes of our study or research, we would define rating as "the evaluation or assessment of something in terms of quality, quantity or a combination of both (source: Project Management Book of knowledge; Glossary of terms. PMI 1987). The definition also carries the idea of a judgment that is made against a scale based on how much or how little of what is required has been attained. The criteria here involve looking at the standard that characterize what is required and the amount or numbers that have been achieved.

Therefore, performance rating in very simple terms, describes the process whereby objective data on the achievement of a deliverable is collected, measured and given a score or a rate. This rate reflects the level of achievement in both qualitative and quantitative terms on a predisclosed scale. The emphasis is on the use of an objective set of data providing information on the performance of a Contractor.

2.1.8 What Constitutes a Good Rating System

(Kovacic, 2009) highlighted on the following as some of the characteristics of a good rating system.

1. It should provide a technique that can be used to measure success or failure in satisfying the evaluating criteria.
2. The criteria set should be measurable
3. The system should be transparent i.e. it should communicate and explain in a clear way the rating result.
4. The system should also set performance levels.

2.1.9 Importance of Ratings

(Kovacic, 2009), again highlighted on the following way as some of the importance of ratings:

a. It promotes internal quality control
b. It also promotes transparency and accountability
c. It assists in the identification of risk levels of activities undertaken.
d. Again, it supports the minimization of compliance costs.

2.1.10 Performance Measurement Frameworks

Over the last two decades, there have been reports on revolution in performance measurement. A huge interest in performance measurement has become evident in practitioner conferences and publications as well as in academic research (Neely, 1998). Investigation reveals that firms or companies applying balanced performance measurement systems as a basis for management do better than those that do not (Lingle & Schiemann, 1996). In order to achieve

this advantage, it is very important for companies to employ an effective performance measurement system that "enables informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through acquisition, collation, sorting, analysis, interpretation and dissemination of appropriate data" (Neely, 1998).

This definition is important as it is evident that a performance measurement system has a number of constituent parts;

- Individual measures that quantify the efficiency and effectiveness of action;
- A set of measures that combine to assess the performance of an organization as a whole;
- A supporting infrastructure that enables data to be acquired, collated, sorted, analyzed, interpreted and disseminated.

In order to maximize gains of performance measurement, it is necessary for companies to maximize the suitability and effectiveness of measurement activities at each of these levels. Various courses of action have been proposed that companies should follow in order to devise and employ performance measurement system (Bourne et al, 2000; Neely et al, 1996). Many frameworks have been proposed that support this course of actions. The purpose of such frameworks is to assist companies to define a set of measures that reflect their objectives and assesses their performance appropriately (Neely, 1998).

2.1.11 Existing Performance Measurement Frameworks

In the early 20th Century, most companies applied frameworks in trying to define a set of measures that they could use in assessing their performance. A typical example is the DuPont pyramid of financial ratios which presented a variety of financial ratios to return on investment. Again, the pyramid of financial ratios presented an unambiguous hierarchical structure relating measures at different company levels (Kennerley & Neely, 2002).

Subsequent to their review of the evolution of management accounting systems, Thomas Johnson and Robert Kaplan highlighted many of the deficiencies in the way in which management accounting information is used to manage businesses (Johnson and Kaplan, 1987). They highlighted the failure of financial performance measures to reflect changes in the competitive circumstances and strategies of modern organizations. These deficiencies indicate shortcomings in the DuPont pyramid. Its cost focus provides a historical view, giving little indication of future performance and encouraging short termism (Bruns, 1998). This prompted organizations to implement non-financial measures that appropriately reflect their objectives as well as financial measures that indicate the bottom line result. Although, General Electric first implemented a balanced set of performance measures in the 1950s (Bruns, 1998), it was the enormous growth in interest in performance measurement in the 1980s and 1990s that brought the wide spread acceptance of the need for organizations to take a balanced approach to measurement.

The most popular of the performance measurement framework has been the balanced scorecard proposed by Kaplan and Norton (1992 and 1996a). The balance scorecard presented four different ways of looking at performance (financial, customer, internal business

and innovation and learning perspectives). The authors identifies the need to ensure that financial performance, the drivers of it (customer and internal operational performance), and the drivers of on-going improvement in future performance are given equal weighting. The balance scorecard reflects many of the attribute of other measurement frameworks but more explicitly links measurement to the organization's strategy. The authors claim that it should be possible to deduce an organization's strategy by reviewing the measures on its balance scorecard.

Kaplan and Norton argued that the full potential of the balanced scorecard will only be realized if an organization links its measures clearly, identifying the drivers of performance (Kaplan and Norton, 1996b). Conceptually, this use of the scorecard is similar to the use of the Tableau de Bord (Epstein and Manzoni, 1997). Developed in France in the early 20th century, the Tableau de Bord establishes a hierarchy of interrelated measures and cascading measures to different organizational levels, forcing functions and divisions of an organization to position them in the context of the company's overall strategy.

Despite its widespread use numerous authors have identified shortcomings of the balanced scorecard. It does not consider a number of features of earlier frameworks that could be used to enhance the framework. The absence of a competitiveness dimension, as included in Fitzgerald's et al's (1991) results and determinants framework, is noted by (Neely et al, 1995). Others emphasized the importance of measurement of the human resources perspective/employees satisfaction, supplier performance, product/service quality and environmental/community perspective (Maisel, 1992; Ewing and Lundahl, 1996, Lingle and Schiemann, 1996; Brown, 1996). Failure of the balanced scorecard to consider these

dimensions limits its comprehensiveness, because not all measures can be included, as in the case with the performance measurement matrix for example.

In the area of the construction industry, several research efforts have dealt with the issue of performance measurement. For instance, (Shen et al, 2003) investigated the Contractor Key Competitiveness Indicators. The researchers used the Analytical Hierarchy Process (AHP) approach to determine the key competitiveness indicators of contractors in the Chinese Construction Market. (Wong, 2004), developed a contractor performance prediction model for the United Kingdom Construction Contractors. The researchers used the Logistic Regression approach to predict contractor effectiveness in the UK market. Another research in this domain is the contractor selection for Design/Build Projects (Palaneeswaran and Kumaraswamy, 2000).

The research focused on developing a model for contractor pre-qualification and bid evaluation in design/build contractor selection process. Also (Singh and Ting, 2006) studied the contractor selection criteria for the Singapore construction Industry. They conducted a local study that aimed to develop a computer – interactive multi criteria decision system for contractor selection involving identification of contractor selection criteria for inclusion in a contractor performance assessment system.

Again (Alarcon and Mourgues, 2002) proposed a contractor selection system that incorporates the contractor's performance prediction. In this research, a modeling framework developed in previous researches was used to develop a conceptual model of a project that depicts a casual structure of the variables, risk and interactions that affects a contractor's performance for

specific project from the owners' point of view. Furthermore, (Waara and Bröchner, 2006) investigated price and Non-price criteria for contractor selection. The purpose of their research was to describe and explain how public owners use multiple criteria for the award of construction contracts. They showed that it is likely that the non-price criteria support the alignment of owner and contractor interests, and that bidder behaviour should be affected by the likelihood of repeated contracts, and by the transparency of owners' evaluation procedures.

2.1.12 Characteristics of Performance Measurement Frameworks

The performance measurement framework discussed in the previous section display a number of key characteristics that would help an organization to identify an appropriate set of the measures to assess their performance:

- The work of (Kaplan and Norton, 1992) emphasizes the fact that the set of measures used by an organization has to provide a "balanced" picture of the business. The set of measures should reflect financial and non-financial measures internal and external measures, and efficiency and effectiveness measures.
- The populated framework of measures should provide a succinct overview of the organisation's performance. For example, the simplicity and intuitive logic of the balanced scorecard has been a major contributor to its wide spread adoption as it is easily understood by users and applied to their organization.
- Each framework demonstrates the need for organizations to implement a set of performance measures that are multi-dimensional. This reflects the need to measure all the areas of performance that are important to the organization's success.

- The Tableau de Bord, along with the work of (Bititci et al, 1998) explicitly demonstrate the fact that performance measures should be integrated both across the organization's functions and through its hierarchy, encouraging congruence of goals and actions.
- The Tableau de Bord and the work of Fitzgerald et al, (1991) explicitly, and the balanced scorecard and performance pyramid implicitly, explain how results are a function of determinates.

This demonstrates the need to measure results and the drivers of them so that the performance measurement system can provide data for monitoring past performance and planning future performance. This demonstrates the way in which measures contributes to an organization's planning (feed forward) and control (feedback) system (Ballantine and Brignall, 1994).

There are also other measurement framework and methodologies, such as shareholder value added or cost of quality which have been developed to focus on the measurement of a specific performance issue (Neely and Adams, 2001).

So far the discussion has presented the key attributes of existing performance measurement framework that organizations can use in indentifying the set of performance measurements that appropriately reflect their performance and objectives.

2.1.13 Key Features of the Major Performance Measurement Models

During the last ten years, there has been an increasing awareness of the needs of improved performance and quality within the total building process, which has hastened the evolution

and subsequent adoption of quality assurance in building works. The construction industry appears to be lacking a clear and uniform evaluation standard for overall construction quality when compared to other industries like the manufacturing industry (Low, 1993). The quality of construction projects has generally been evaluated by the use of subjective measures (Low, 1993). To overcome this difficulty, various performance models for contractor performance have been developed. Ahadzie et al (2005) among others have highlighted the origin, structure and composition of the major Performance Measurement Models, which have been synthesized in Table 2.2 (on page 37).

The Table indicates the stakeholders under consideration and the performance indicators used. Additionally, the background of the projects initially used in the development of these performance measurement models is also indicated. The table also suggests that construction performance can be categorized in many ways, including the following categories: construction project performance, construction productivity, project viability and project quality. These categories form the basis by which models have been developed to measure construction performance at various stages of development.

TABLE 2.2: ORIGIN, STRUCTURE AND COMPOSITION OF THE MAJOR PERFORMANCE MEASUREMENT MODELS

PRS	SISIND (Brazil, 1993)	AHP (Saudi Arabia, 1996)	CDT (Chile, 2002)	Blueprint (USA, 1996)	KPI (UK, 1998)	CV (Hong Kong, 2001)	QLASSIC (Malaysia, 2001)	IPI (India, 2002)	CHBM (USA, 2003)
Stakeholders Considered	Contractors	Project	Main Contractor	Client Management team, supplier, customers	Client contractor, Management team, End-user	Client, Management team, Contractor Suppl., Ext. factors	Main Contractor	Client, Management team, Customer	Owner and Contractor companies
Source of projects information	Housing and Commercial	Industrial	General const. works	General const. works	General	General const. works	General	R & D engineering projects	Generally heavy industrial, building and infrastructure
Performance Indicators	Cost deviation, Time deviation, Percentage of plan completed, Client satisfaction (owner), Time for selling units, Contracting index, Supplier performance, Subcontracted material and design, No. of accidents and total-man-hours, Construction site best practice index, Non-conformity index in the unit delivery, Degree of employee satisfaction, Training index	Project viability	Deviation of cost by project, Deviation of construction due date, Change in amount contracted Rate of sub-contract, Cost client complains, Efficiency of direct labour, Accident rate, Risk rate, Effectiveness of planning, Urgent orders, Productivity performance	Business objectives, Project objectives, Project inputs, Outputs and targets, Customer focus, Leadership, Delivery process, Employee empowerment	Design cost, Design time, Construction cost, Construction time, Productivity, Profitability, Safety, Defects, Client satisfaction on product and service	Client variables, Project variables, Project environment variables, Project management variables, Project team variables	Quality of workmanship, Quality between projects, Standards and specifications , Contractor performance, Productivity level of project	Benefit/merit, Risk, Project, Preference/ Category bias, Project status, Decision effectiveness, Production preparedness, Cost effectiveness, Customer expectations Sponsor expectations, Project management, expectation	Project cost growth, Project budget factor, Project schedule factor, Total project duration, Change cost factor, Recordable Incident Rate, Low workday Case incident rate, Total field rework, Factor phase cost Factor, phase cost growth, Phase duration Factor, construction phase duration

SOURCE: Ahadzie et al (2005)

2.2 PERFORMANCE MEASUREMENT IN THE CONSTRUCTION INDUSTRY IN GHANA

This section is to help establish the real situation with respect to performance measurement in the Ghanaian Construction Industry. However, before that there is the need to give some insight into the nature of the industry.

2.2.1 Historical Development of the Ghanaian Construction Industry

The construction industry dates back to pre-independence period with total dominance by a few large foreign firms that executed all new infrastructural works in the public sector. The maintenance of these projects was however, the responsibility of the Public Works Department (PWD) (IMC Report, 2002).

The period immediately after independence in 1957 saw massive investment in the infrastructure sector of the economy, intended to create the socio-economic environment for rapid economic growth and development. This effort culminated in the setting up of the Ghana National Construction Corporation (GNCC) in joint venture with Messrs Sahrel of Israel with capital share of 60% for Sahrel and 40% for Government. Their mandate was to execute some of the public buildings, roads and housing estates (IMC Report, 2002) revealed.

With the dissolution of GNCC after the change of government in 1966, the State Construction Corporation (SCC) was established to take over the role originally performed by GNCC (IMC Report, 2002).

With Independence came the aspiration of government to expand the economy and ensure rapid development. It became necessary for the PWD to be broken up into specialized functional areas like the provision of water, electricity, roads, etc. These functional areas created the need for locally trained professionals as well as local contractors to undertake works in specified areas. The Government, realizing the need for trained and skilled professionals to manage the institutions created out of PWD, saw the need to train such personnel (IMC Report, 2002).

Currently, the construction industry is composed of about 22,500 local contracting firms and few large foreign firms(IMC Report, 2002). In spite of their limited number the foreign firms dominate the industry, handling almost all large construction projects funded with external resources. Donor funded works constitute about 55% of total infrastructural works with GOG accounting for the remaining 40%. The remaining 5% is accounted for by the private sector (IMC Report, 2002).

2.2.2 The Significance of the Ghanaian Construction Industry

Construction activities and its output is an integral part of a country's national economy and industrial development. The construction industry can mobilize and effectively utilize local and human material resources in the development and maintenance of housing and infrastructure to promote local employment and improve economic efficiency (Anaman and Amponsah, 2007).

(Field and Ofori, 1988) stated that the construction industry makes a noticeable contribution to the economic output of a country; it generates employment and incomes for the people and therefore the effects of changes in the construction on the economy occur at all levels and in virtually all aspects of life. Hence, the construction is regarded as an essential and highly visible contributor to the process of growth (Field and Ofori, 1988).

(Ahadzie 2007) supported the above assertion when he mentioned that in the early 1990s, the contribution of the industry to GDP dropped to a long term low of about 2.7% but mentioned again that, recent figures indicate that it has once again appreciated to a significant level of 4.2%. Currently, the construction industry's share of GDP and contribution to growth are 8.9% and 1.0% respectively (ISSER, 2007)

2.2.3 Contractor Performance Studies in Ghana

The quality of performance and negative perceptions of Ghanaian Contractors has become a great concern to the Government and general public (Taskforce Report, 2007). In this regard, a five person taskforce was therefore set up by the Ministry of Finance and Economic Planning (MOFEP) on October 10, 2007 to study the situation, make recommendations and submit its findings. The Taskforce Report recommended a rating and ranking scheme to contractors to encourage them to strive for excellence. The Report also proposed an Award Scheme for contractors which they believe would immensely improve the construction in Ghana. This will subsequently remove the negative perception of local contractors and enable them to compete favourably with international contractors.

The literature search revealed that not much documentation had been undertaken in respect of contractor performance in Ghana. However, (Owusu Tawiah, 1999) identified two main factors affecting contractor performance in Ghana. The two factors were Financial and Managerial Capacities of the firm. Under the financial factors (Owusu Tawiah, 1999) mentioned that contractor's financial stability in terms of access to credit was questionable and that has gone a long way to affect their performance over the years. Again under the managerial capacities he

identified site management practices, lack of technical expertise among others as factors influencing contractor performance in Ghana.

Furthermore, (Mensah, 2008; Danso, 2008) investigated into factors affecting the various classes of contractors in Ghanaian construction industry. They identified qualified staff, employee development, organizational structure, equipment holding, labour relations, site management practice, communication, health and safety practices, client satisfaction, access to finance, risk management, among others as factors affecting contractor performance in Ghana.

2.3 SUMMARY

In summary, the discussion so far has presented some criteria (Table 2.3 below) that could be applied in rating contractor performance. Conventionally, it has become impossible to develop a set of performance measures for the construction industry without incorporating the traditional measures of time, cost and quality. The reason these measures based on the iron triangle are so popular is that they are simple to apply and also objective. However, recently, limiting performance criteria to these traditional measures eliminate the interest of stakeholders (Atkinson, 1999).

In this regard, researchers and practitioners in the project management discipline like (Turner, 1993, Atkinson, 1999 & Wateridge, 1998) have proposed some unconventional measures which have the potential to satisfy the interests of other stakeholders. Some of these measures are effective risk management, client satisfaction, co-operation with stakeholders, environmental management, health and safety, to mention but few have become accepted for assessing performance. These go to suggest that the criteria identified for the study are widely supported

by performance measurement literature and are not limited to only the traditional measures but also represent the interest of stakeholders. Table 2.3 below presents some performance criteria identified from the literature search.

In furtherance, the review of performance measurement in the construction industry generally has reaffirmed the need to have an objective rather than a subjective technique of measuring contractor performance. Again, the recommendations of the taskforce set up by MOFEP suggest that there is no objective framework for assessing contractor performance, hence, the study.

Table 2.3 Performance Criteria Identified from the Literature Search

Item	Criteria
1	Quality of final building product
2	Duration of construction (Delivery on schedule)
3	Ability to formulate and maintain practical programmes
4	Standard of workmanship
5	Site Management Practices (i.e. effective quality control system on site)
6	Labour relations at site
7	Relations with sub contractors and statutory authorities
8	Attention to site welfare and safety
9	Degree of co-operation with stakeholders
10	Appropriateness of organizational structure in managing the Project (i.e. well laid out lines of responsibility, delegation and communication at site).
11	Effectiveness of communication (i.e. managing information flow and consultants correspondents)
12	Employee development (i.e. qualified staff, motivation and training
13	Prompt correction of defects
14	Creative and innovative ability in executing the project (i.e. ability to propose alternative constructional methods at site).
15	Effective risk management (i.e. managing activities that can lead to financial loss and delay in delivery time)
16	Environmental management(i.e. managing the impact of construction activities on the environment)
17	Client satisfaction (in terms of product and service outcome)
18	Financial stability (i.e. access to credit)
19	Operational base of contractor (i.e. a well set out office accommodation
20	Equipment holding (i.e. equipment in use at site as against equipment listed during tendering)
21	Estimated Cost of project

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CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

Following the review presented in chapter 2.0, this chapter now introduces and discusses the theoretical framework for the study. Afterwards, the design of the research instrument, the sampling technique and the sample size are also presented. The chapter concludes with an overview of the statistical technique used in analyzing the data.

3.1 Theoretical Framework for the Study

This section discusses the underlying theoretical framework for the study. The review presented in chapter 2.0 (See section 2.1.10) identified a number of performance measurement frameworks like the Tableau de Bord, DuPont pyramid of financial ratios, Analytical Hierarchy Process, Contractor Key Competitiveness Indicators, the Balanced Scorecard. The theoretical framework for the study draws on the balanced scorecard (BSC) performance measurement system developed in 1992 by Dr. Robert Kaplan and Dr. David Norton at the Harvard Business School (Kaplan and Norton, 1992). The reason for drawing on the balanced scorecard for the theoretical framework was that the balanced scorecard identifies and integrates four different ways of looking at performance (financial, customer, internal business, and innovative and learning perspectives (See Figure 3.1, Page 53). Again, the balanced scorecard reflects many of the attributes of other measurement frameworks but more explicitly links measurement to the organization's strategy. Also, the balanced scorecard provides a "balanced" picture of the business in that the set of measures reflect financial and non-financial measures, internal and external measures, and efficiency and effectiveness measures.

Unlike earlier performance measurement system (example, the DuPont pyramid of financial rates), the BSC measures performance across a number of different perspectives, which are, financial, customer, internal business process and an innovation and learning perspectives.

Through the use of the various perspectives, the BSC captures both leading and lagging performance measures, thereby providing a more "balanced" view of company performance. Leading indicators include measures such as customer satisfaction, new product development, on-time delivery, employee competency development, etc. Traditional lagging indicators include financial measures such as revenue growth and profitability. The BSC performance measurement system has been widely adopted globally, in part, because this approach enables organizations to align all levels of staff around a single strategy so that it can be executed more successfully.

The balanced scorecard as shown in Figure 3.1 on page 53 suggests that an organization should be viewed from four perspectives, and to develop metrics, collect data and analyze it relative to each of these perspectives:

The Learning & Growth Perspective

This perspective includes employee training and corporate cultural attitudes related to both individual and corporate self-improvement. In a knowledge worker organization, people are the only repository of knowledge and are also the main resource. In the current climate of rapid technological change, it is becoming necessary for knowledge workers to be in a continuous learning mode. Metrics can be placed to guide managers in focusing training funds where they

can help the most. In any case, learning and growth constitute the essential foundation for success of any knowledge-worker organization.

Kaplan and Norton emphasize that 'learning' is more than training; it also includes things like mentors and tutors within the organization as well as that ease of communication among workers that allows them to readily get help on a problem when it is needed. It also includes technological is needed tool; what the Baldrige criteria call "high performance work systems".

The Business Process Perspective

This perspective refers to internal business processes. Metrics based on this perspective allow the managers to know how well their business is running, and whether it is prudent and services conform to customer requirements. These metrics have to be carefully designed by those who know these processes most intimately; with our unique missions these are not something that can be developed by outside consultants.

The Customer Perspective

Recent management philosophy has shown an increasing realization of the importance of customer focus and customer satisfaction in any business. These are leading indicators; if customers are not satisfied, they will eventually find other suppliers that will meet their needs. Poor performance from this perspective is thus a leading indicator of future decline, even though the current financial picture may look good. In developing metrics for satisfaction, customers should be analyzed in terms of kinds of customer and the kinds of processes for which we are providing a product or service of those customer groups.

The Financial Perspective

Kaplan and Norton do not disregard the traditional need for financial data. Timely and accurate financial data will always be a priority, and managers will do whatever necessary to provide it. In fact, often there is more than enough handling and processing of financial data. With the implementation of a corporate database, it is hoped that more of the processing can be centralized and automated. But the point is that, the current emphasis on financial data leads to the "unbalanced" situation with regard to other perspectives. There is perhaps a need to include additional financial-related data such as risk assessment and cost-benefit data in this category.

Figure 3.1: The Balanced Scorecard
Source: Adapted from Kaplan and Norton (1992)

In relating the performance criteria identified from the literature search to the balanced scorecard, it would be appropriate to define the criteria taking into consideration the four perspectives (that is, customer, internal business processes, financial and learning and growth) of the balanced scorecard.

Considering the definition for the various perspectives, client satisfaction, degree of cooperation with stakeholders, duration of construction, relations with sub-contractors and statutory authorities and operational base of contractor were classified under the customer perspective. Again, employee development, labour relations at site, attention to site welfare, health and safety, prompt correction of defects, creative and innovative ability in executing the project were classified under the learning and Growth perspective.

Also, financial stability, estimated cost of the project, effective risk management and equipment holding were classified under the financial perspective.

Furthermore, quality of final building product, ability to formulate and maintain practical programmes, standard of workmanship, site management practices, effectiveness of communication, environmental management and appropriateness of organizational structure in managing the project were classified under business process perspective.

3.1.2 Performance Criteria

To provide clarity to the criteria as per the four perspectives of the balanced scorecard, a brief notes on the criteria are presented below.

*Quality of the final building product***:**

It is a good practice to implement procedures that would ensure that quality is achieved when the final product evolves. In this regard, it is very important to initiate a quality control system in place. Quality control is a system of routine technical activities, to measure and control the quality of the activity being executed (Lowe, 2003). The quality control should be designed to provide routine and consistent checks to ensure data integrity, correctness and completeness, identify and address errors and omissions and also to document and archive inventory materials and record all quality control activities.

The construction process is no different from other industry process, which means quality control system can be implemented. In trying to achieve quality at the end of the process, the contractor is supposed to ensure that the materials employed in the construction process are of a higher standard and meets specifications. This can be achieved through the testing of materials. Contractor should initiate a quality control system on site.

Duration/Ability to formulate practical program

In determining contract durations there is the need to establish production rates for each controlling item; adopting production rates to a particular project, understanding potential factors such as business closures, environmental constraints and computation of contract time with a process schedule (Baird, 2009). Time value for money should be considered since time overruns

increases cost of project in most developing countries. Different clients attach different importance to delivery on time. Effects of delay to contractor, client and the general public especially with road works i.e. associated traffic and environmental pollution in terms of dust.

Contract time for most construction projects are determined by developing a progress schedule or programme. Programme should be practical and achievable, all things being equal. Items should be arranged by chronological sequence of construction operations.

Standard of Workmanship

Ideally a competent and experienced site supervisor should be employed to supervise the day to day activities of the site. Also, the artisans employed should be very skilled in their field of trade. This is to ensure that all activities are carried out in accordance with contract drawings and supporting data. It goes a long way to affect the quality of the final product.

Site Management Practices

Poor site management practices are reflected in increases in total cost of various inputs to the construction process (Kashiwagi, 2007). For example, the cost of materials can rise through wastage resulting from bad storage, pilfering or lack of care in use. It can increase the cost of labour because of loss of low productivity, poor workmanship necessitating rectification and loss of time between activities arising from inadequate planning of the flow of operations. The cost of sub-contractor's work can rise because of poor planning, resulting in a delayed start on site and the subsequent submission of claims against the main contractor. The list of plant can be increased because of low usage and inadequate maintenance.

Relations with Sub-contractors/Statutory Authorities

Works undertaken for a client by a contractor is usually covered by a works contract. In any Client (contractor) relationship, both parties have duties and obligations (Tantari, 2006). Similarly, if the client/contractor employs subcontractors to carry out some or all of the work, all parties will have some responsibilities. This suggests that, a reasonable enquiry about the subcontractor's competency should be undertaken since the main contractor may be held liable for the subcontractor's non-performance or negligence. Main contractors should therefore, have a good working relationship with subcontractors so that they can deliver on schedule and to specifications of the contract. To achieve performance, the contractor should incorporate subcontractors programme schedule into main progress schedule for the work. The appointment of subcontractors must not depend solely on technical ability but should take full account of their competence.

Attention to site welfare, health and safety

In using this criterion for assessing contractor performance, there is the need to verify whether the firm's contractor has a company health and safety policy. Again, there is the need to assess what measures can be employed at the site to ensure health and safety of workers or staff. Are there safety books, helmets, gloves, first aid kit and nose mask (Conrow, 2003).

Also, does the contractor have a professional or well trained health and safety supervisor or advisor? All these will help to ensure that the contractor executes the project well and that unexpected costs and problems are minimized.

Furthermore, adequate welfare facilities like sanitary conveniences, washing facilities, changing rooms and lockers, canteen, etc. for construction workers should be provided at the site. A health and safety file should be kept at the site to record useful health and safety information which will help manage the contractor's health and safety risks.

Degree of Cooperation with Stakeholders

Stakeholder involvement is critical to the success of any organization (Elijido-Ten, 2005). This suggests that for a contractor to achieve the highest level of performance there is the need to achieve a level of cooperation or support from stakeholders.

The contractor should ensure that there is maximum communication with stakeholders to promote their interest in the project. The relationship between the contractor and the stakeholders should be one that would facilitate the achievement of the project objectives.

Appropriateness of Organizational Structure for managing the Project

The choices of organizational structure best suited for the company are many and depend on several factors such as the size of the company, its geographical location, the type of work being done and the managerial and technical skills are available (Heath and Norman, 2004).

In this wise, the contractor is expected to put in place an effective organizational structure which would still be functional in the absence of the managing director. The delegation of authority to qualified and competent representatives can facilitate the smooth running of the project.

Effective Communication

Poor communication has often been a problem in the construction industry and this stems partly from the way in which the industry is organized (Mintzberg, 1999). Site personnel come from different backgrounds and have varying contributions to make at a variety of levels. A large amount of information passes between them and this creates the need for a well organized and effective communication network. Effective communication is dependent on an efficient method of conveying instructions and information and of ensuring satisfactory feedback. A variety of communication channels may be used. For example, a line hierarchy links people making decisions with those who carry them out. However, the setting up of appropriate channels of communication is only a part of the process. The contractor would have to ensure that these channels of communication operate effectively by enabling the information to reach the right people at the right time and in the manner required by the recipient.

Employee Development

In order to obtain maximum output from employees, management of these employees is a critical feature (Philips, 2004). There is the need for the contractor to motivate the personnel to give their maximum output in every activity being undertaken. The contractor should expose the employees to new methods and approach through periodic training and upgrading of skills to meet current trends in the industry.

Effective Risk Management

Risk management is the structural application of policies, procedures and practices for evaluating, monitoring and mitigating risks. (Klemetti, 2006).

The contractor, in trying to manage risk should put in place a risk management plan to ensure that all activities relating to the project are managed to prevent financial losses, and delay in delivery time. In accessing credit lines, the contractor should evaluate the payment schedules before taking the decision to acquire loans to facilitate the project completion.

Environmental Management

Environmental management has recently become an essential requirement on construction sites (Lazarus, 2005). The contractor should have an organizational policy on environmental management that shows how the impact of construction activities on the environment would be managed. Again, the contractor should employ construction materials which have less adverse effect on the environment.

Client Satisfaction

Client satisfaction is the responsiveness of services or the willingness of providers to meet client/contractor needs (WHO, 2000). The contractor should be aware that clients provide an invaluable perspective on success. Therefore, it is important to use information they provide to improve the outcome of the product or services.

Financial Stability

The contractor should be in good standing to attract credit to improve cash flow without depending solely on payment schedules.

Equipment Holding

Construction equipment is one of the most important physical assets in a construction firm (Skibniewski, 2006). It plays an important role in construction operations and constitutes a major portion of construction project.

The contractor should be seen to be employing the relevant equipment in the operations at site as against equipment listed during tendering. Again, the contractor should hold the minimum equipment required to carry out operations at site.

Based on the above discussion, the following conceptual framework was proposed to help underpin contractor performance rating in Ghana (See Figure 3.2 below).

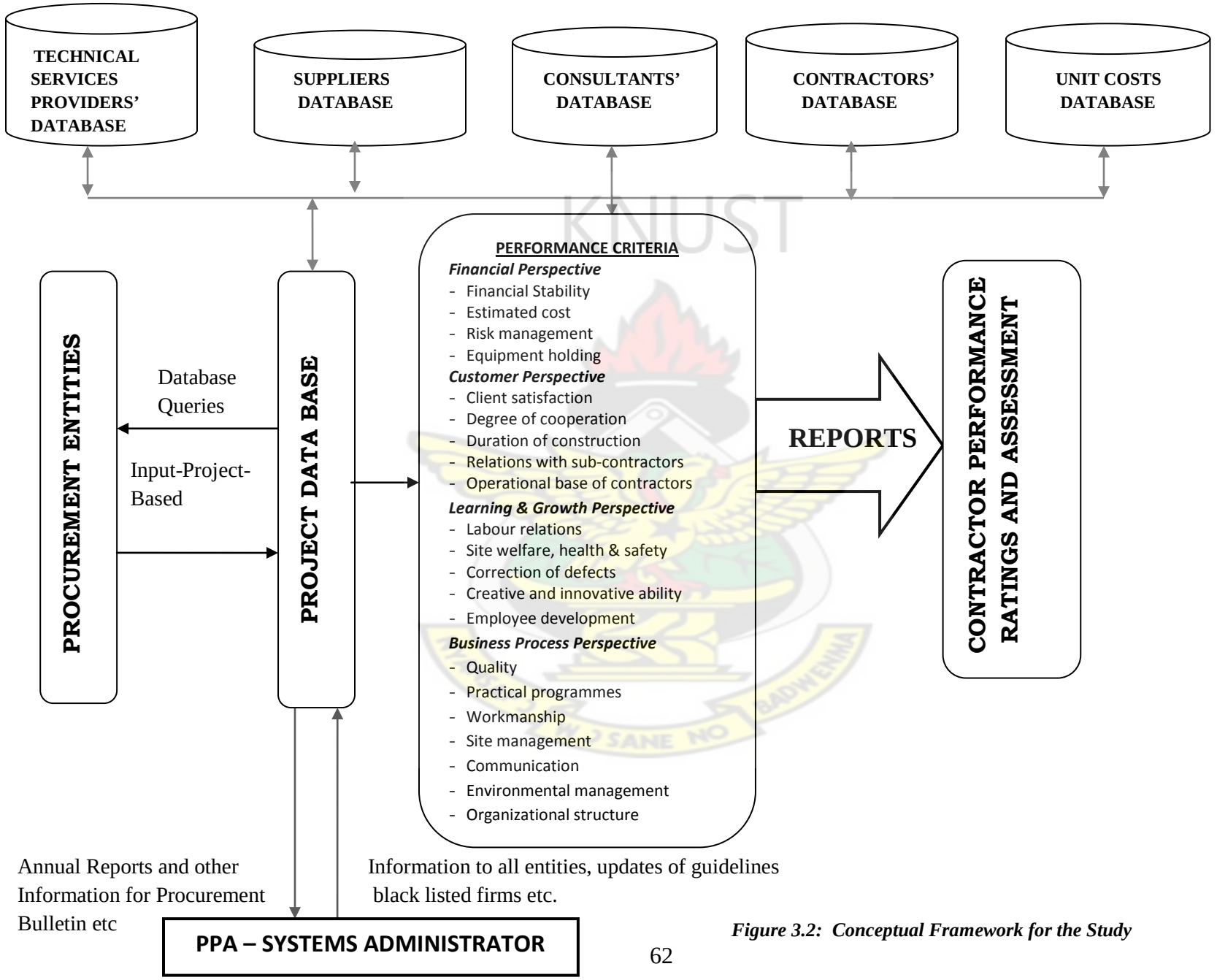

Figure 3.2: Conceptual Framework for the Study

3.1.3 The Conceptual Framework

The conceptual framework, as shown in Figure 3.2 above, has incorporated the four perspectives of the balanced scorecard by defining the various performance criteria identified from the literature review. The conceptual framework proposes the development of a central database with certain unique features representing suppliers, contractors and consultants. The databases will contain information on each class including but not limited to:

- Name of firm
- Year of establishment
- Firm's classification
- Personnel
- Office location
- Contact details etc.

The statutory bodies namely, SSNIT, IRS, MWRWH, etc will be given access into the database to check the authenticity of the information provided by the suppliers, contractors and consultants. As evidenced from the conceptual framework, the procurement entities will be the various ministries, departments, agencies and other governmental bodies. The projects database would contain all necessary information and documentation relating to the project. Also, the contractor performance ratings and assessment would generate reports containing the weightings that would be derived after the application of the performance criteria in assessing the performance of the contractors.

This central database will possess a user interface which would permit interactions with procurement entities. All projects, past and present can be accommodated by the database for future reference and manipulation by the system. Data input will be done at the Procurement Entity level Due to the centrality of projects (i.e. brings together consultants, contractors, etc), entries will be effected on project basis. User accounts will be provided to make available different levels of access to various institutions. The Public Procurement Authority (PPA) will have the sole authority to enter every section of the database to access information for reference purposes only.

This central database will therefore draw up projects specific data that can be derived from the input made by the procurement entities and statutory requirements. This system will therefore be equipped with the facility to generate reports on contractor's performance per procurement entity.

3.2 DESIGN OF QUESTIONNAIRE

A questionnaire is a series of questions asked to individuals to obtain statistically useful information about a given topic. When properly constructed and responsibly administered, questionnaires become a vital instrument by which statements can be made about specific groups or people or entire populations. In designing the questionnaire, the objectives of the study were first established. This was done to help in determining what questions to ask and how to ask them. Again, very short and concise questions were fielded as questions that are long and wordy

may appear confusing to respondents. All these were done in order to ensure that the responses received would be reliable.

In designing the questionnaire, the aim of the study, which is, identifying a set of criteria that would be applicable in rating the Ghanaian contractor's performance, was taken into consideration. In this regard, the performance criteria as captured in the conceptual framework were used as the basis for the proposed performance criteria that would be applicable in the Ghanaian construction industry.

The questionnaire was designed into three main parts. The first part dealt with the demographics of the respondents with respect to their professional background, the number of years they have been working in the industry, the number of projects they have executed over the last five years and the total value of projects they have executed over the last two years. This background information was imperative in order to ascertain the likely reliability and credibility of the data.
The second part of the questionnaire provided professionals with the opportunity to give their perception of the Ghanaian contractor's performance and the construction industry generally both previously and the currently.

The third and final part dealt with information on the criteria respondents considered as important and applicable to the assessing of contractor performance in the Ghanaian construction industry. Based on the criteria, Likert rating scales was adopted to help extract the appropriate ratings. Likert scales generally include an equal number of positively and negatively phrased

statements, all of which employ the same response scale and are randomly distributed throughout the questionnaire (Cheung and Mooi, 1994). Numerical scores of 1 to 5 frequently are assigned to each statement in accord with the direction of the statement and the ordering of response categories.

Subsequently, the performance criteria were to be ranked per their level of importance by the likely respondents (that is, professionals in the construction industry) on a five point Likert rating scale of 1-5 where,

1= unacceptable performance

2= below satisfactory performance

3= satisfactory performance

4= above satisfactory performance

5= outstanding performance

Likert scales require that the response categories must be equally-spaced, ordered response categories that can be structured on one-dimensional latent continuum (Cheung and Mooi, 1994).In this regard statistical tool such as t-test could be used to analyze the criteria.

3.2.1 Pre-Testing of Questionnaire

In the author's bid to check the questionnaire and making sure it was accurately capturing the intended information, a pre-testing was undertaken among a smaller subset of target respondents before the main survey. Using purposive sampling techniques, 10 construction professionals

were initially contacted on phone to brief them on the aim and objectives of the study and also to seek their readiness to be a part of the pre-testing of the study. These professionals were selected due to their level of experience in the Ghanaian construction industry. A period of three weeks was spent in pre-testing the questionnaires.

The pre-testing provided a platform to brainstorm with respondents to understand their problems with answering any of the questions, if they were able to understand the question correctly and how they felt about the questions. The pre-testing was undertaken via visits to the offices of the 10 professionals and it must be mentioned that they were very co-operative. Out of the 10 professionals, 7 suggested that the inclusion of estimated cost of the project as criterion for assessing contractor performance was not critical. Their main reason was that contractors do little to influence the cost of a project (that is, in terms of cost overruns and working within a budget). In view of this, estimated cost of a project was excluded from the criteria provided by the theoretical framework in the final questionnaire since it was viewed as more of a factor affecting contractor performance rather than a criterion.

3.3 SAMPLING TECHNIQUE

The Purposive Sampling Technique was used for the data collection. This was because the study wanted to elicit views of persons who have specific expertise like architects, engineers and quantity surveyors in the construction industry. Again, the advantage of doing this is that you are not on your own trying to defend your decisions; you have some acknowledged experts backing

you. The target population was Consultants (i.e. professionals in the construction industry) in the Greater Accra and Ashanti Regions only.

These regions were selected due to the following:

a) Although the scope of the study is the whole of Ghana, it was imperative to focus on the most representative samples of the intended population to obtain the answers that are relevant to the study.

b) Also, the practicality and logistical concerns limits the number of people that can be interviewed and this is supported statistically since it is possible to represent a population based on a number of samples.

c) Again, Accra, in the Greater Accra region, is the administrative capital and commercial centre of Ghana where majority of consultants (i.e. professionals) operate.

d) Furthermore, Kumasi, in the Ashanti region is the second capital of Ghana and has the second highest concentration of Consultants in the Construction Industry. Again, the research is being carried out in Kumasi.

e) Location and access to the office of the target population was easy.

3.3.1 Determination of the Sample Size

The total population of registered professionals in the construction industry is nine hundred and seventeen (917) spread all over the country. The determination of the sample size was thereafter based on the formula:

$n = n^1/(1 + n^1/N)$ - (Kish, 1965)

where n = Sample size

$n^1 = S^{2/}V^2$

N = Population = 321

V = The standard error of sampling distribution = 0.05

S = The maximum

= 0.25

P = The proportion standard deviation in the population elements (total error = 0.1 at a confidence level of 95%

S^2 = P (1 – P) = (0.5) (0.5) of population element that belong to the defined class.

Using the above parameters for the above equation give a sample size of 90 for the contractors. Assuming a return rate of 40%, this number was increased to 126. Thereafter, proportional representation was used to allot the questionnaires. The sample frame obtained is detailed in Table 3.1 below.

Table 3.1: SAMPLE FRAME OF THE PROFESSIONALS

Professionals	No. of Listed Professionals	No. of Questionnaires Allotted
Architects	350	48
Civil Engineers	358	49
Quantity Surveyors	209	29
Total	**917**	**126**

Source:

Architects : Daily Graphic, July 20, 2006, No. 149797 pp 27

Civil Engineers : Daily Graphic, June 14, 2007, No. 150074 pp38-39

Quantity Surveyors : 2004 Annual Quantity Surveyors Seminar and Workshop

Herein called professionals or consultants

3.4 QUESTIONNAIRE ADMINISTRATION

The administration of the questionnaire began in early days of July 2009. In respect of the fact that the method employed in the pre-testing of the questionnaire was largely successful and reliable the same method was employed in the main survey. In view of this the questionnaires were personally sent to the offices of the selected professionals in the sample. A period of six weeks was allowed for the administration of the questionnaires and all completed questionnaires were to be retrieved by the end of the six weeks. In the author's bid to increase the rate of response an additional two weeks was allowed for the retrieval of the rest of the questionnaires. After the elapse of the additional two weeks allowed, all other questionnaires which had not been retrieved were considered non-responsive.

A total of 126 questionnaires were administered to professionals in the Ghanaian construction industry. A total of 65 questionnaires representing 52% of the total questionnaires administered were returned. Table 3.2 shows details of the questionnaires administered and the return rate. A questionnaire was said to be responsive where the relevant questions in relation to a professional's experience and understanding with regards to performance criteria were fully answered. Table 3.3 shows details of the responsiveness of the questionnaire.

Table 3.2 Details of Questionnaires Administered and Returned

	Sample size	**No. of Questionnaires distributed**	**No. of Questionnaires returned**	**Percentage returned**
Professionals	126	126	65	52

Source: Field Survey, July – August, 2009

Table 3.3 Responsiveness of Questionnaires Returned

	No. of Questionnaires returned	**No. of Responsive Questionnaires**	**Percentage of Responsiveness**
Professionals	65	65	100

Source: Field Survey, July – August, 2009

3.5 STATISTICAL PROCEDURE EMPLOYED

3.5.1 One Sample T-Test

One sample t-test is a statistical procedure that is used to know the mean difference between the sample and the known value of the population mean. In one sample t-test, the population mean is known. A random sample is drawn from the population and then comparison is made between the sample mean and the population mean for a statistical decision to be made as to whether or not the sample mean differs from the population mean. In one sample t-test, the sample size should be less than 30. For example, a sample can be drawn from the city and its mean compared against the mean of the country (population mean). In trying to ascertain whether the city mean differs from the country mean and to compare the two means, the statistical test known as the one sample t-test is employed.

In employing One Sample t-test as a statistical tool for analysis the following assumptions are made:

1. In one sample t-test, dependent variables should be normally distributed.
2. In one sample t-test, samples drawn from the population should be random.
3. In one sample t-test, cases of the samples should be independent.
4. In one sample t-test, sample size should not be less than 30.
5. In one sample t-test, the population mean should be known.

In trying to determine the one sample t-test values the following procedure was followed:

1. Set up the hypothesis for one sample t-test:

a. Null hypothesis: in one sample t-test, null hypothesis assumes that there are no significant differences between the population mean and the sample mean.

b. Alternative hypothesis: In one sample t-test, the alternative hypothesis assumes that there is a significant difference between the population mean and the sample mean.

2. Calculate the standard deviation for one sample t-test by using this formula:

$$S=\sqrt{\sum \frac{(x-\bar{x})^2}{n-1}}$$

Where,

S = Standard deviation for one sample t-test

X – Sample mean

n = number of observations in sample

3. Calculate the value of the one sample t-test, by using this formula:

$$t = \frac{\overline{X} - \mu\sqrt{n}}{S}$$

Where,

T= one sample t-test

μ = population mean

4. Calculate the degree of freedom by using this formula:

$V = n-1$

Where,

V = degree of freedom

5. Hypothesis testing: In hypothesis testing for the one sample t-test, statistical decisions are made to decide whether or not the population mean and the sample mean are different. In hypothesis testing, compare the calculated value with the table value. If the calculated value of the one sample t-test is greater than the table value, then reject the null hypothesis. Otherwise, reject the alternative hypothesis. In relating hypothesis testing to confidence intervals, the central limit theorem states that the population standard deviation σ is unknown, the standard deviations, S, can be used in the formula as long as the sample size is 30 or more. A criterion is rejected if its p-value is greater than 0.05.

3.5.2 One Sample t-test and SPSS:

In most of the statistical software, one sample t-test options are available. In using the SPSS to perform the one sample t-test, the following procedure was used:

1. Click on the "SPSS 16" icon from the start menu.
2. Click on the "open data" icon and select the "data one sample t-test".
3. Click on the "analysis" option and select the "compare mean" from the analysis.

Select "one sample t-test from the compare mean option. Clicking on the one sample t-test, a window will appear. This window is called the one sample t-test window. In this window, select

the dependent variable and insert them into the test variable box. Type the population mean value in the test value box. Click on “option” and select the “percentage of confidence interval”. Clicking on the “ok” button, the result table for the one sample t-test will be displayed.

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CHAPTER FOUR

ANALYSIS AND INTERPRETATION OF DATA

4.0 INTRODUCTION:

This chapter is basically 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 also deals with the respondents' perception of contractor performance in the construction industry. The third and final part deals with the one sample t-test analysis on the dependent variables.

4.1 EXPERIENCE

4.1.1 Professionals' Working Experience

From Table 4.3 below, it could be observed that the 21% responses received had been working in the industry between 5-10 years, 16% between 11-20 years and 11% between 21 – 30 years and 4% of the responses received fell between the range of 31 years and above. Again, the responses in Table 5.3 reflect a representation of each category of years of experience. This presents a varied perception of contractor performance and will further go to prevent the responses being skewed in one direction.

Table 4.1 Percentage of Professionals and Their Working Experience:

	Years of Experience			
Professionals	**5 – 10 years**	**11 – 20 years**	**21 – 30 years**	**31 years and above**
	21	16	11	4

Source: Field survey, July – August, 2009

4.1.2 Relationship between Years of Experience and Projects Undertaken

It could be observed from Table 4.4 below that 5% of respondents who fell within the 5 – 10 years of experience category had undertaken between 1-5 projects within the last five years, 8% of respondents within this category had undertaken between 6-10 projects, 3% within this category had undertaken between 11-15 projects and 5% within this category had undertaken between 16 and above projects within the last five years. Again, Table 5.4 below indicates that 3% of respondents who fell within the 11 – 20 years of experience category had undertaken between 1-5 projects within the last five years, 3% of respondents within this category had undertaken between 6-10 projects, 3% within this category had undertaken between 11-15 projects and 7% within this category had undertaken between 16 and above projects within the last five years.

Furthermore, Table 5.4 below shows that no respondent within the 21 – 30 years of experience category had undertaken between 1-5 projects within the last five years, 2% of respondents within this category had undertaken between 6-10 projects, 2% within this category had undertaken between 11-15 projects and 7% within this category had undertaken between 16 and above projects within the last five years.

Lastly, no respondent within the 31years and above of experience category had undertaken between 1-5 projects within the last five years, 1% of respondents within this category had undertaken between 6-10 projects, 1% within this category had undertaken between 11-15 projects and 2% within this category had undertaken between 16 and above projects within the last five years. The above information provides knowledge of the background of the respondents which would help in creating confidence in the credibility of the da

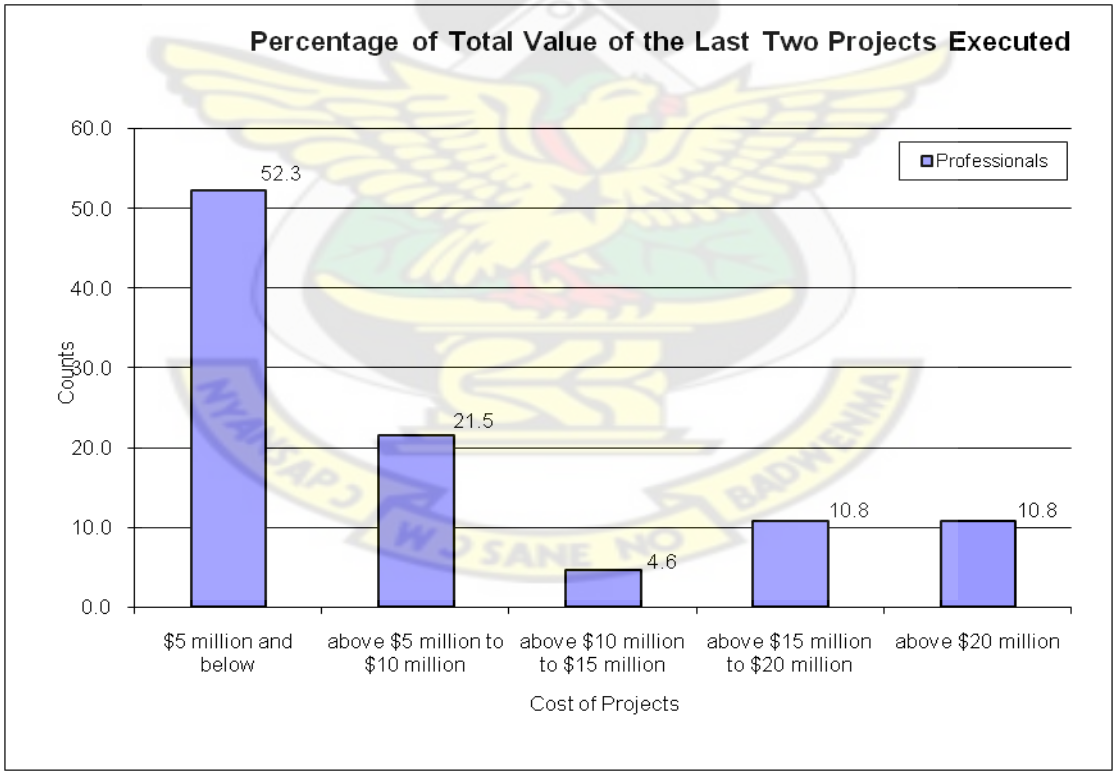
Table 4.2: Relationship between Years of Experience and Projects Undertaken

Years of Experience	**5 – 10 years**				**11 – 20 years**				**21 – 30 years**				**31 years and above**			
No. of Projects Undertaken within the last 5years	**1 – 5 projects**	**6 – 10 projects**	**11 – 15 projects**	**16 and above**	**1 – 5 projects**	**6 – 10 projects**	**11 – 15 projects**	**16and above Project**	**1 – 5 projects**	**6 – 10 projects**	**11 – 15 projects**	**16and above**	**1 – 5 projects**	**6 – 10 project**	**11 – 15 projects**	16 and above
Professionals	5%	8%	3%	5%	3%	3%	3%	7%	-	2%	2%	7%	-	1%	1%	2%

Source: Field Survey, July – August, 2009

4.2 TOTAL VALUE OF PROJECTS EXECUTED

From the graph below, it can be deduced that the responses received from the professionals indicated that 52.3% had total value of the last two projects executed at $5.0m. Again, 21.5% had executed the last two projects with a total value ranging between $5.0m - $10.0m and 4.6% were within the range of $10.0m - $15.0m. Furthermore, 10.8% indicated that they had executed projects with the total value ranging between $15.0m - $20.0m and above $20.0m. These values go to suggest that the projects executed by the respondents were high profile jobs where performance could not be compromised and it also meant that respondents understood the basis of what constituted performance.



4.3 KNOWLEDGE OF CONTRACTOR PERFORMANCE RATING MECHANISM.

From Table 4.3 below, it can be observed that 81% of respondents confirmed that they had no knowledge of any contractor performance rating mechanism in the Ghanaian Construction Industry with the remaining 19% responding in the affirmative. The 19% that responded in the affirmative referred to the Ministry of Water Resources, Works and Housing Classification for Contractors as a rating mechanism. The above information goes to buttress the basis of this research as the percentages clearly depict that there is no performance rating mechanism for the Ghanaian Construction Industry.

Table 4.3: Professionals Knowledge of Contractors Performance Rating Mechanism

	No. of Respondents	Yes	No	Total
Professionals	**65**	**19%**	**81%**	**100%**

4.3.1 Relevance of Contractor Performance Rating Mechanism

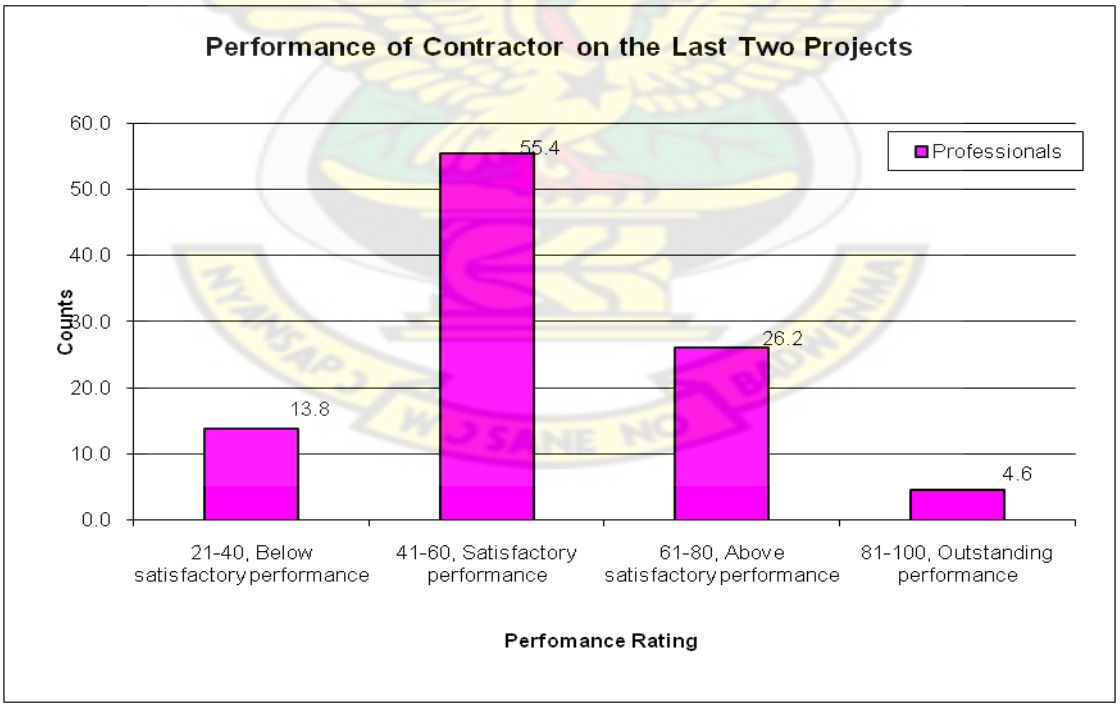
Table 4.4 below revealed that 100% of respondents responded in affirmative that it would be very important for a contractor performance rating mechanism to be developed for the Ghanaian Construction Industry. This supports the perception in the problem statement in chapter one that there is no framework within which an objective assessment of what constitutes a good or acceptable performance by contractors in the construction industry can be made and legitimized.

Table 4.4: Relevance of Contractor Performance Rating Mechanism

	No. of Respondents	Yes	No	Total
Professionals	**65**	**100%**	**-**	**100%**

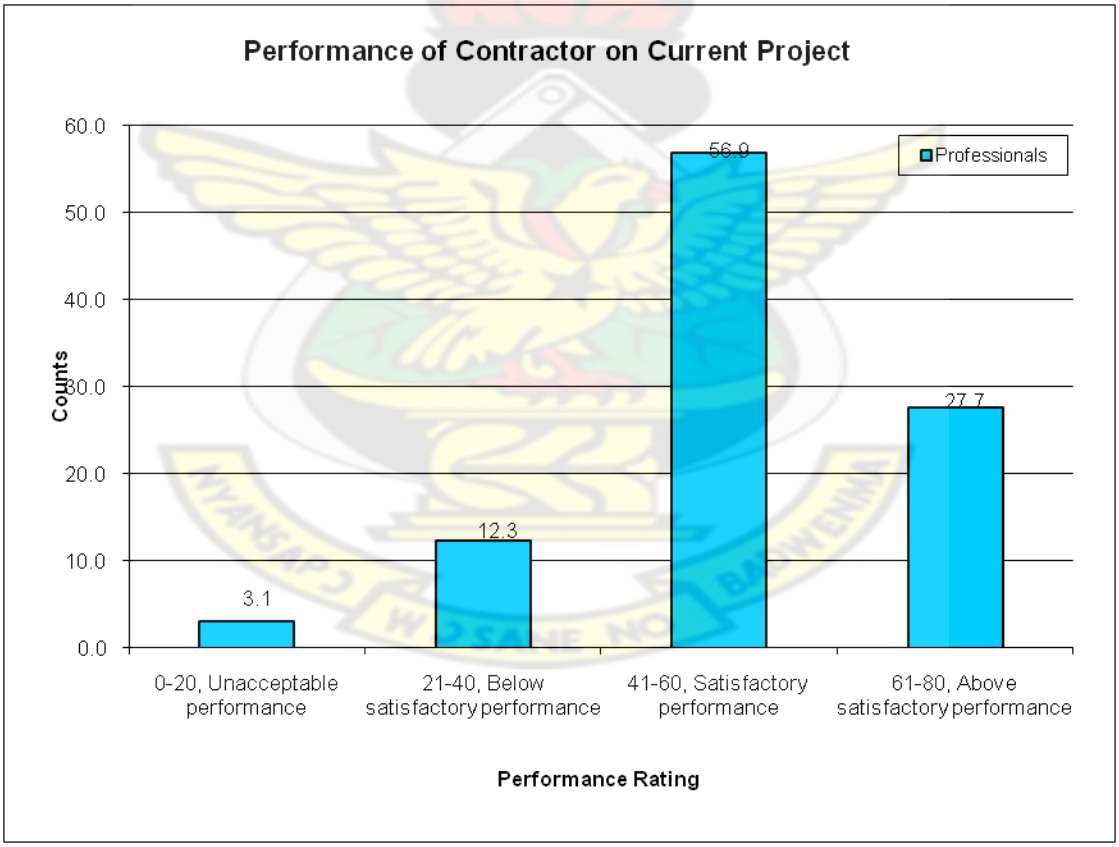
4.3.2 Perception of Contractor Performance

The graph below indicates respondents' perception of contractor performance on the last two projects. While 13.8% of respondents viewed contractor performance as below satisfactory, 55.4% of respondents' indicated satisfactory performance. Again, 26.2% of respondents' were of the view that contractor performance was above satisfactory and 4.6% viewed contractor performance as outstanding.



The graph below indicates respondents' perception of contractor performance on projects that are being executed currently. While 3.1% of respondents viewed contractor performance as unacceptable, 12.3% of respondents' indicated below satisfactory performance. Again, 56.9% of respondents' indicated satisfactory performance and 27.7% viewed contractor performance as above satisfactory.

The percentages deduced from the analysis so far indicates that the general perception of the Ghanaian contractor's performance as judged by the respondents is satisfactory.



4.4: ANALYSIS OF PERFORMANCE CRITERIA

The statistical analysis employed in analyzing the performance criteria is the one sample t-test. The one sample t-test was employed to ascertain the relative importance of the variables.

4.4.1 One Sample T-test for Ranking Criteria

One sample t-test is used to establish the mean difference between the sample and known value of the population mean. The hypothesis for one sample t-test is set as (see chapter 3, section 3.5.1):

H_o: $\mu=\mu_o$

H_a: $\mu<,>\mu_o$

Where H_o means the null hypothesis, H_a means the alternative hypothesis and Uo means the population mean or the hypothesized.

As with confidence intervals, the central limit theorem states that normal distribution can be assumed when the sample size is more than 30. Again, (Field, 2005) argues that with a sample size of more than 50, the sampling distribution will almost always approach normal distribution notwithstanding the size of the sampling frame or population. Therefore, with a sample size of 126 out of a population of 917, the underlying assumptions of the central limit theorem were applied to firm the decision that the sample size is relatively adequate to use statistical inferences.

With the foregoing, SPSS was used to perform a statistical t-test to establish whether the population considered a particular criterion to be important or not. The statistical t-test analysis

produced two tables, namely, the one sample statistics and the one sample test showing test significance. The details of the two tables are indicated in Tables 4.5 and 4.6.

The mean, standard deviation and standard error for each performance criterion are presented in Table 4.5. As defined above the null hypothesis for each criterion was insignificant, the alternative hypothesis for each criterion was significant and μ_o as the population mean. With reference to the Likert rating scale adopted, ratings of 4 and 5 representing above satisfactory performance and outstanding performance, μ_o which is the population mean was set at a suitable level of 3.5 (see for instance Ling, 2002). The significance level was also set at 95% in accordance with predictable risk levels (Cohen, 1992). Therefore, based on the five-point Likert rating scale, a performance criterion was considered significant if it had a mean of 3.5 or more. Where two or more criteria have the same mean, the one with the lowest standard deviation was assigned the highest importance ranking (Field, 2005).

The standard error is the standard deviation of sample means and is a measure of how representative a sample is likely to be to the population. A large standard error suggests that there is a lot of variability between means of different samples. A small standard error suggests that most sample means are similar to the population mean and so the sample is likely to be an accurate reflection of the population. The standard error for all the means is in the neighbourhood of zero suggesting that the sample chosen is an accurate reflection of the population (Table 4.5)

Table 4.5: Results of t-test showing One Sample Statistics

Item	Criteria	N	MEAN	STD. DEVIATION	STD. ERROR MEAN
1	Quality of final building product	65	3.985	1.125	0.140
2	Duration of construction (Delivery on schedule)	65	3.585	1.158	0.144
3	Ability to formulate and maintain practical programmes	65	3.308	1.014	0.126
4	Standard of workmanship	65	3.877	1.097	0.136
5	Site Management Practices (i.e. effective quality control system on site)	65	3.708	1.011	0.125
6	Labour relations at site	65	3.292	0.861	0.107
7	Relations with sub contractors and statutory authorities	65	3.754	0.952	0.118
8	Attention to site welfare and safety	65	3.462	1.160	0.144
9	Degree of co-operation with stakeholders	65	3.431	1.089	0.135
10	Appropriateness of organizational structure in managing the Project (i.e. well laid out lines of responsibility, delegation and communication at site).	65	3.739	1.065	0.132
11	Effectiveness of communication (i.e. managing information flow and consultants correspondents)	65	3.662	0.957	0.119
12	Employee development (i.e. qualified staff, motivation and training	65	3.292	0.980	0.122
13	Prompt correction of defects	65	3.609	1.121	0.140
14	Creative and innovative ability in executing the project (i.e. ability to propose alternative constructional methods at site).	65	3.415	1.130	0.140
15	Effective risk management (i.e. managing activities that can lead to financial loss and delay in delivery time)	65	3.508	1.002	0.124
16	Environmental management(i.e. managing the impact of construction activities on the environment)	65	3.415	1.102	0.137
17	Client satisfaction (in terms of product and service outcome)	65	3.954	1.096	0.136
18	Financial stability (i.e. access to credit)	65	3.785	0.960	0.119
19	Operational base of contractor (i.e. a well set out office accommodation	65	3.415	0.950	0.118
20	Equipment holding (i.e. equipment in use at site as against equipment listed during tendering)	65	3.939	1.029	0.128

Out of the 20 criteria, 15 had standard deviation values which are greater than 1.0, which suggests that respondents had different interpretations for the criteria. However, the remaining 5 had their standard deviation values less than 1.0, which suggests some agreement among respondents in how the criteria were interpreted. In furtherance, discussion on the t-test below is expected to give some possible reasons.

The t-test (Table 4.6) shows the mean values (that is, test value) of the population mean, t, which is the one sample t-test, df, which I s the degree of freedom and the significance (that is, p-value). This p-value provides a basis for a statistical decision to be made as to whether or not the population mean and sample mean are equal. From the t-test table, the p-value is for two-tailed test and since the study is interested in one-tailed test, the p-values are divided by two. The results of the criteria are detailed in Table 4.7

Table 4.6: Results of One Sample Test showing test significance

Item	Criteria	Test Value = 3.5					
		t	df	Sig. (2-tailed)	Mean Diff.	95% Confidence Interval of the Diff.	
						Lower	Upper
1	Quality of final building product	3.473	**64**	0.001	0.485	0.206	0.763
2	Duration of construction (Delivery on schedule)	0.589	**64**	0.558	0.085	-0.202	0.372
3	Ability to formulate and maintain practical programmes	-1.529	**64**	0.131	-0.192	-0.444	0.059
4	Standard of workmanship	2.770	**64**	0.007	0.377	0.105	0.649
5	Site Management Practices (i.e. effective quality control system on site)	1.656	**64**	0.103	0.208	-0.043	0.458
6	Labour relations at site	-1.945	**64**	0.056	-0.208	-0.421	0.006
7	Relations with sub contractors and statutory authorities	2.149	**64**	0.035	0.254	0.018	0.490
8	Attention to site welfare and safety	-0.267	**64**	0.790	-0.038	-0.326	0.249
9	Degree of co-operation with stakeholders	-0.512	**64**	0.610	-0.069	-0.339	0.201
10	Appropriateness of organizational structure in managing the Project (i.e. well laid out lines of responsibility, delegation and communication at site).	1.806	**64**	0.076	0.238	-0.025	0.502
11	Effectiveness of communication (i.e. managing information flow and consultants correspondents)	1.362	**64**	0.178	0.162	-0.076	0.399
12	Employee development (i.e. qualified staff, motivation and training	-1.709	**64**	0.092	-0.208	-0.451	0.035
13	Prompt correction of defects	0.780	**64**	0.438	0.109	-0.171	0.390
14	Creative and innovative ability in executing the project (i.e. ability to propose alternative constructional methods at site).	-0.603	**64**	0.548	-0.085	-0.365	0.196
15	Effective risk management (i.e. managing activities that can lead to financial loss and delay in delivery time)	0.062	**64**	0.951	0.008	-0.241	0.257
16	Environmental management(i.e. managing the impact of construction activities on the environment)	-0.619	**64**	0.538	-0.085	-0.358	0.189
17	Client satisfaction (in terms of product and service outcome)	3.339	**64**	0.001	0.454	0.182	0.725
18	Financial stability (i.e. access to credit)	2.390	**64**	0.020	0.285	0.047	0.523
19	Operational base of contractor (i.e. a well set out office accommodation	-0.718	**64**	0.475	-0.085	-0.320	0.151
20	Equipment holding (i.e. equipment in use at site as against equipment listed during tendering)	3.436	**64**	0.001	0.438	0.184	0.693

Table 4.7: Summary of t-test showing rankings, results of 1-tailed test and significance

Item	Criteria	Mean	Standard Deviation	Ranking	Sig. (1-tailed)	Statistically Significant
1	Quality of final building product	3.985	1.125	1	0.0005	**Yes**
2	Client Satisfaction	3.954	1.096	2	0.0005	**Yes**
3	Equipment holding	3.939	1.029	3	0.0005	**Yes**
4	Standard of workmanship	3.877	1.097	4	0.0035	**Yes**
5	Financial Stability	3.785	0.960	5	0.01	**Yes**
6	Relations with sub contractors and statutory authorities	3.754	0.952	6	0.0175	**Yes**
7	Appropriateness of organizational structure in managing the Project (i.e. well laid out lines of responsibility, delegation and communication at site).	3.739	1.065	7	0.038	**Yes**
8	Site Management Practices	3.708	1.011	8	0.05	**Yes**
9	Effectiveness of communication (i.e. managing information flow and consultants correspondents)	3.662	0.957	9	0.089	No
10	Prompt correction of defects	3.609	1.121	10	0.219	No
11	Duration of Construction	3.585	1.158	11	0.279	No
12	Effective risk management (i.e. managing activities that can lead to financial loss and delay in delivery time)	3.508	1.002	12	0.4755	No
13	Attention to Site Welfare and Safety	3.462	1.160	13	0.395	No
14	Degree of co-operation with stakeholders	3.431	1.089	14	0.305	No
15	Operational base of contractor	3.415	0.950	15	0.2375	No
16	Environmental management(i.e. managing the impact of construction activities on the environment)	3.415	1.102	16	0.269	No
17	Creative and innovative ability in executing the project (i.e. ability to propose alternative construction methods at site)Client satisfaction (in terms of product and service outcome)	3.415	1.130	17	0.274	No
18	Ability to formulate and maintain practical programmes	3.308	1.014	18	0.0655	No
19	Labour relations at site	3.292	0.861	19	0.028	**Yes**
20	Employee development (i.e. qualified staff, motivation and training)	3.292	0.980	20	0.05	**Yes**

The details in Table 4.7 reveal that *quality of final building product* emerged as the highest ranked criteria for rating contractor performance whilst employee development emerged as the lowest. Apart from quality of final building product, *client satisfaction* (p=0.0005), *equipment holding* (p=0.0005), *standard of workmanship* (p=0.0035), *financial standing* (p=0.01), *relations with subcontractors and statutory authorities* (p=0.0175), *appropriateness of organizational structure in managing the project* (p=0.038) and *site management practices* (p=0.05) emerged as criteria that could be used in rating contractor performance. Largely, the findings support other

studies as (Xiao & Proverbs, 2003; Danso, 2008; Zavadskas & Kaklauskas, 1996) defined overall contractor performance to embrace construction quality, client satisfaction, construction time and sustainable development, the philosophy being that the achievement of one aspect of performance should not be at the expense of another.

Notwithstanding, it is surprising to acknowledge that, whilst *prompt correction of defects* and *duration of construction* were ranked 10th and 11th respectively and were not statistically significant, *labour relations* and *employee development* were ranked 19th and 20th respectively and were statistically significant. A possible reason for this surprising result can be attributed substantially to its potential for inclusion in the next valuation for payment. The ranking suggests that, generally, *prompt correction of defects* qualifies to be a criterion for rating contractor performance but not significant in the context of the Ghanaian construction industry. The position of *duration* (which is among the traditional criteria of cost, time and quality) *of construction* on the ranking scale, that is, 11th suggests that, generally, it is an important criterion (Baird, 2009). However, professionals in the industry do not consider it as significant since payment schedules for construction projects are generally not reliable and consistent. Again, most government (largest employer in the industry) funded projects extend beyond their completion periods with major reason being delay in payments. This suggests that delivery on time is not an issue of concern to major stakeholders in the construction industry but stakeholders are more concerned with quality and client satisfaction.

Again, Table 4.7 indicates that the 19th and 20th criteria on the ranking scale, that is, *labour relations at site* and *employee development*. Their positions on the ranking scale suggests that they are not important but professionals in the industry consider the two as statistically

significant, in that improving labour relations at site and skills of personnel have the potential of improving the overall performance of contractors (Philips, 2004). Other interesting findings that the analysis produced were that *effectiveness of communication* and *effective risk management* ranked 9th and 12th respectively but both emerged statistically insignificant. This suggests that in practice, communication channels are established right from the onset and access to contractual information is easily accessible (Mintzberg, 1999).

On the issue of risk management, most contractors in the industry are confronted with the risk of securing loans from financial institutions. The major reason is that the interest rates (42% per annum, Bank of Ghana rates, 2009) charged on these loans is so high. Now, with contractors having in mind the erratic payment schedules in the industry the option is to allow the project to be self-financing rather than incur losses through loan acquisitions. Thus, it affects the delivery of the project in that completion schedules are not achieved and also time value for money promotes cost overruns on projects (Klemetti, 2006). This, to some extent, suggests why the criterion, *ability to formulate and maintain practical work programmes* was ranked 18th and did not emerge statistically significant.

It is important to note that *attention to site health and safety* and *environmental management* were not considered statistically significant by professionals in the industry. Again, it is worth noting that in Ghana, only the mining industry has openly shown that it is concerned about environmental management and health and safety as almost every contract within the mining industry demands evidence of environmental impact assessment report and health and safety policy. However, experience and practice have shown that tender data in most tender documents in the construction industry do not require potential tenderers to submit such reports as part of

the qualification documents. Furthermore, the cultural and technological advancement of the country do not promote the enabling environment for these criteria to be well appreciated (Lazarus, 2005).

In addition to the criteria discussed as statistically insignificant so far, degree of co-operation with stakeholders, creative and innovative in executing the project and operational base of the contractor were also considered statistically insignificant, though, have the potential to improve the overall performance of contractors.

4.5 SUMMARY

The findings of this study have shown that aside the conventional measures of performance, consideration should be given to stakeholder perspective or interest like relations with customers, employees, financiers and the wider community as proposed by Love et al, 2000.

On how the findings reflect international perspective, researchers and practitioners in the project management discipline like (Turner, 1993, Atkinson, 1999, Wateridge, 1998) have proposed unconventional measures which has the potential to satisfy interest of stakeholders rather than limiting performance criteria to the traditional measures of cost, quality and time. Aside quality, which is part of the traditional measures the findings also support the international assertion that other conventional measures like client satisfaction, labour relations, employee development, etc., which have the potential to satisfy the interests of other stakeholders can be applied as performance criteria in assessing contractor performance.

What is unique about the findings of the study in the Ghanaian context is that, time(construction duration) which is part of the traditional measures of performance was not statistically

significant due to the fact that delay in payments on most construction projects in Ghana results in delay in completion periods.

This chapter has so far presented an analysis of the demographics of the respondents, one sample test to the criteria.

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CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

The preceding chapters have so far presented the aim, objectives and the problem statement of the study, a review of literature on contractor performance, the research methodology employed and analysis of the data. This chapter presents a summary of the findings that the analysis produced. The study is then concluded with a summary of recommendations for further research work and the possible implementation of the recommendations to industry.

5.1 RECAP OF HOW OBJECTIVES WERE ACHIEVED

The following are how the objectives set in chapter one were achieved.

5.1.1 Develop Theoretical Framework for Assessing Contractor Performance

The study set out to develop a theoretical framework for assessing contractor performance for the Ghanaian construction industry. Based on the balance scorecard, an appropriate framework which does not only consider financial measures but also considers non-financial measures like learning and growth measures, client satisfaction and internal business process was developed.

5.1.2 Develop an Appropriate Research Instrument to elicit data on Contractor Performance from Ghanaian construction professionals

Based on the theoretical framework a set of questionnaire encompassing the demographics and a set of twenty criteria was designed to elicit information from construction professionals.

5.1.3 Analyze the Data with One Sample T-test Statistical Analysis with the help of SPSS

The data on contractor performance elicited from construction professionals was analyzed with One Sample T-test statistical analysis was used to determine the significance level of the criteria.

5.2 CONCLUSIONS

Based on the findings the following conclusions emanated from the study:

5.2.1 Knowledge of Contractor Performance Rating Mechanism

The study has generally established that the Ghanaian Construction Industry currently does not have any documentary evidence of a mechanism for rating contractor performance. This supports the report by a 5-person Taskforce set up by the Ministry of Finance and Economic Planning (MOFEP) on October 10, 2007 (Taskforce Report, 2007). In their report the Taskforce recommended that a contractor performance rating mechanism should be developed for the Ghanaian Construction Industry as a means of improving the industry.

5.2.2 Relevance of Contractor Performance Rating Mechanism

The study established that professionals are of the opinion that the importance of measuring or rating contractor performance cannot be downplayed if the desire is to achieve improvement in the construction industry since all major stakeholders like client organizations, consultants and contractor associations stand to benefit from such a mechanism. The literature has highlighted among others that performance rating has assisted in productivity measurement and benchmarking (see chapter two). Also, performance rating helps in determining effective use of resources (see chapter two).

5.2.3 Perception of Contractor Performance

The study established that the general perception of the Ghanaian contractor's performance is satisfactory performance as per the ranking scale adopted by the study. This supports the assertion that the Ghanaian contractor is generally perceived as inefficient (Taskforce Report, 2007, The Ghanaian Times Thursday, March 12, 2009, Pg. 9).

5.2.4 Criteria for Rating Performance of Contractors

Twenty criteria were identified from the literature review of various authorities in performance measurement to be considered in rating contractor performance. These criteria were also identified with construction professionals in Ghana in a preliminary survey.

These criteria were then ranked by construction professionals as per the ranking scale adopted by the study. The study then went further to test for their level of significance (see chapter 5, Table 5.8). After the test for significance, ten criteria were then established as criteria that could be applied in rating contractor performance in the Ghanaian construction industry. The criteria were:

1. Quality of Final Building product
2. Standard of Workmanship
3. Site Management Practices
4. Labour Relations at Site
5. Relations with sub contractors and statutory authorities
6. Appropriateness of Organizational Structure
7. Employee Development
8. Client Satisfaction
9. Equipment Holding

10. Financial Stability

5.3 RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made.

5.3.1 Performance Rating Mechanism for Contractors

The study established that there is no documentary evidence of a mechanism for rating and ranking contractors in the Ghanaian Construction Industry. This implies that the level of acceptable performance is determined by the individual involvement or assessing performance.

It is therefore recommended that performance rating and ranking of contractors be introduced in the construction industry of Ghana to ensure systematic and sustainable development in the industry. In consultation with the key client entities and professional bodies, a performance rating scheme should be developed to enable entities assess and rate the performance of each contractor on each project. It is again believed that, an established rating mechanism will provide a good reference base for future evaluations to ensure that only competent contractors are awarded contracts to ensure high quality performance of projects.

Furthermore, it is expected that the performance rating mechanism would:

- Provide an objectives and consistent method for measuring contractor performance
- Provide the contractor opportunities to improve job performance between rating periods.
- Increase quality, cost effectiveness and efficiency of the construction process and the finished product.

5.3.2 Award Scheme for Contractors

As a means of motivating contractors to perform better, the study recommends the institution of an award scheme for contractors in Ghana. It is recommended that the award scheme should be planned and implemented periodically. In implementing the award scheme, Associations and Government Agencies should be contacted to nominate contractors for awards. Entities and contractors' Associations should provide a list of high performing contractors for each category of contractor. To have a fairly objective assessment there would be the need to contract the services of consultants to analyze and score for each contractor. It is recommended that the consultants should have full access to any data regarding the contractor's records, site and progress reports. Architects, Engineers, Quantity Surveyors and Environmental Specialist should form the core of the consultants' team.

After this, the rating mechanism in association with the input from the Associations, government Agencies will be used in selecting the award winners. This mechanism could be used to assist the procurement process in the selection of contractors.

5.3.3 Capacity Building of Contractors

The study revealed that the rating mechanism could form the basis for developing a training programme on performance for Ghanaian contractors.

It is therefore recommended that government in association with both stakeholders in the construction industry should establish training institutions to train and certify skilled personnel for the construction industry. Also, private sector agencies should be encouraged to establish plant and equipment hiring scheme to allow contractors access to needed equipment. Incentives

like tax relief could be given to such agencies to help reduce cost of hiring and owning of a plant or equipment. The acquisition or access to plant or equipment would help build the capacity of contractors to compete with foreign firms for large contracts and also improve their overall performance generally.

Again, the institution of capital access schemes would go a long way to improve the financial abilities of contractors. These access schemes should be implemented alongside an effective monitoring and evaluation of contractor performance by financial institutions.

Furthermore, government should improve and adhere to payment schedules in order to improve the cashflow of contractors. The contractors will always have the confidence to work expecting payment to be made in time so that they can also credit suppliers. This will help boost performance.

5.3.4 Further Research Work

The study proposed a framework within which contractors performance rating could be executed. In furtherance to this, the study has proposed a set of criteria for rating contractor performance from the view point of construction professionals. It is therefore recommended that further research should be undertaken to ascertain a set of criteria that clients and contractors would propose in rating contractor performance. It is believed that, in addition to the criteria suggested by the professionals, the criteria from clients and contractors would help provide a set of criteria that would reflect the opinions of major stakeholders in the Ghanaian construction industry. Again, further studies could be undertaken to ascertain the variances among the various professionals in the terms of the criteria that they have proposed.

5.4 SUMMARY

The recommendations made are summarized as follows:

(i) Development of a contractor performance rating and ranking mechanism for the Ghanaian Construction Industry.

(ii) Institution of an award scheme for contractors.

(iii) Educate contractors on the need to train their employees to learn new skills and be abreast with modern trends and innovations in construction.

(iv) Build contractor capacity in relation to equipment and financial requirements.

(v) Ascertain a set of performance criteria that could be proposed by Clients and Contractors

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APPENDIX

QUESTIONNAIRE TO GHANAIAN PROFESSIONALS (CONSULTANTS) IN THE CONSTRUCTION INDUSTRY IN GHANA

Project Topic: **CONTRACTORS' PERFORMANCE RATING MECHANISM FOR THE GHANAIAN BUILDING CONSTRUCTION INDUSTRY**

INTRODUCTION:

This questionnaire forms part of an MSc. (Construction Management) dissertation being undertaken by Mr. Kingsley Afre Nduro at the Department of Building Technology, KNUST. The essence of this questionnaire is to identify in order of priority, the criteria that can be used in rating the performance of contractors in the construction industry.

BACKGROUND

The Ghanaian contractor has generally been perceived as inefficient. These remarks sometimes go to the extent to say that foreign contractors using only Ghanaian artisans and materials perform better than their Ghanaian counterparts. With these concerns, one may ask, what basis can be used to objectively compare the output of contractors? It is to answer some of these questions that there is the need to propose a framework within which contractors' performance can be assessed in the construction industry.

OBJECTIVES OF STUDY

- To review similar rating mechanism elsewhere in the construction industry with the view of proposing a workable rating mechanism.
- To identify the criteria relevant to performance rating of construction contractors in Ghana.
- To propose a framework under which the contractor performance rating mechanism would be operational and effective.

INSTRUCTION TO RESPONDENTS

A maximum of thirteen (13) questions have been designed. Please respond by ticking in the appropriate column.

Your assistance in responding to the questionnaire would be very much appreciated. The confidentiality of your response is guaranteed.

Kingsley Afre Nduro
Department of Building Technology
KNUST

QUESTIONNAIRE

1. Type of Consulting firm

   ☐ Architectural

   ☐ Civil Engineering

   ☐ Quantity Surveying

   Specify if other _____

2. How long have you been working in the industry?

   ☐ 5 – 10 years

   ☐ 11 – 20 years

   ☐ 21 – 30 years

   ☐ 31 years and above

3. How many projects have you undertaken within the last five years?

   ☐ 1 – 5 Projects

   ☐ 6 – 10 Projects

   ☐ 11 – 15 Projects

   ☐ 16 and above

4. What is the total value of the last two projects executed?

   $_____

5. Do you know about any contractor performance rating mechanism for the Ghanaian construction industry?

   ☐ Yes ☐ No

6. If yes, name it_____

7. Is the performance rating mechanism in question (8) currently in use?

☐ Yes ☐ No

8. If no, do you think that the development of performance rating mechanism for contractors in the Ghanaian construction industry would be relevant?

☐ Yes ☐ No

9. How would you judge the performance of the contractor on the last two projects you have undertaken?

☐ 0 – 20%, Unacceptable performance

☐ 21 – 40%, below satisfactory performance

☐ 41 – 60%, satisfactory performance

☐ 61 – 80%, above satisfactory performance

☐ 81 – 100%, outstanding performance

10. How would you judge the performance of the contractor on a project you are currently executing?

☐ 0 – 20%, Unacceptable performance

☐ 21 – 40%, below satisfactory performance

☐ 41 – 60%, satisfactory performance

☐ 61– 80%, above satisfactory performance

☐ 81 –100%, outstanding performance

11. The following are some criteria identified from the study that can be used for rating the performance of contractors. Using the ranking scale, rank these criteria:

No.	Criteria	RANKING				
		0 - 20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
		1	2	3	4	5
1	Quality of final building product					
2	Duration of construction (Delivery on schedule)					
3	Ability to formulate and maintain practical programmes					
4	Standard of workmanship					
5	Site Management Practices (i.e. effective quality control system on site)					
6	Labour relations at site					
7	Relations with sub contractors and statutory authorities					
8	Attention to site welfare and safety					
9	Degree of co-operation with stakeholders					
10	Appropriateness of organizational structure in managing the Project (i.e. well laid out lines of responsibility, delegation and communication at site).					
11	Effectiveness of communication (i.e. managing information flow and consultants correspondents)					
12	Employee development (i.e. qualified staff, motivation and training					
13	Prompt correction of defects					
14	Creative and innovative ability in executing the project (i.e. ability to propose alternative constructional methods at site).					
15	Effective risk management (i.e. managing activities that can lead to financial loss and delay in delivery time)					
16	Environmental management(i.e. managing the impact of construction activities on the environment)					
17	Client satisfaction (in terms of product and service outcome)					
18	Financial stability (i.e. access to credit)					
19	Operational base of contractor (i.e. a well set out office accommodation					
20	Equipment holding (i.e. equipment in use at site as against equipment listed during tendering)					

12 Aside the above criteria are there any criteria that you want the study to consider in rating contractor performance? Please state and rank them.

No.	Criteria	RANKING				
		0 - 20%	**21 - 40%**	**41 - 60%**	**61 - 80%**	**81 - 100%**
		1	**2**	**3**	**4**	**5**

13. Are there any other comments you want to bring to the attention of the study?

_____

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