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COLLEGE OF ARCHITECTURE AND PLANNING

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ENABLING WORLD-CLASS PERFORMANCE IN GHANAIAN CONTRACTORS: A FRAMEWORK FOR BENCHMARKING

By

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DOCTOR OF PHILOSOPHY, CONSTRUCTION MANAGEMENT

DECLARATION

I hereby declare that this submission is my own work towards the award of a PhD. To the best of my knowledge, this work contains neither material previously published by another person nor material which has been accepted for the award of any other degree of this University or other, except where due acknowledgement has been made in the text at the point of use.

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ABSTRACT

Significant progress has been made in many countries towards improving the performance of their respective construction industries. Ghana bucks this trend with widespread underperformance by contractors through a high incidence of projects which fail to meet client objectives. Ghanaian contractors are faced with a lot of problems which affect their performance. These include poor access to finance, low technologies, poor human resource base, low profitability and low turnovers all of which affect the viability and sustainability of Ghanaian contractors and the Ghanaian construction industry as a whole. Evidence from past research suggests that the Ghanaian construction industry will benefit from the experiences of countries with more advanced construction industries. Benchmarking the Ghanaian construction industry against the best-in-class both within and outside will expose Ghanaian contractors to the standards of excellence achieved in other industries and other countries, how these were achieved and strategies on how such standards can be attained in the Ghanaian construction industry. Benchmarking, however, is virtually unknown within the Ghanaian construction industry. Whilst benchmarking offers opportunities for improving Ghanaian contractor performance, the associated costs are often high. Problems such as the identification of suitable benchmarking partners and the lack of conceptual models hinder the uptake of benchmarking in the Ghanaian construction industry. This study explores the development of a simple, cost effective benchmarking framework for Ghanaian contractors. Relevant literature, existing benchmarking frameworks, models for improving performance and international excellence awards are reviewed. The weaknesses and strengths of the existing frameworks, models and international excellence awards are identified. In the development of a benchmarking model for Ghanaian contractors, the identified strengths and weaknesses are taken into account. To enhance the usability of the benchmarking framework for Ghanaian contractors, critical success factors (CSFs) and key performance indicators (KPIs) are identified from which users may select the CSFs applicable to their respective needs. The most important of these factors are selected and incorporated into the benchmarking framework developed for Ghanaian contractors. The study reviews relevant literature to identify the factors which affect the performance of Ghanaian contractors most. Using a questionnaire-based survey of Ghanaian contractors, identified factors were further explored. The survey found that "access to finance" was the most common problem amongst Ghanaian contractors. This problem is explored further with banks through a questionnairebased survey to identify the factors which affect contractor access to finance. Using the KPIs developed for Ghanaian contractors, a performance measurement system (PMS) has been developed for Ghanaian contractors. The PMS can be used by Ghanaian contractors, their clients and other third party organisations to be able to independently assess the performance of Ghanaian contractors. The performance measurement system consists of two separate tools – the Project Scoresheet (***ProScor***) and the Contractor Scorecard (***ConScor***). ***ProScor is*** used to measure contractor performance on specific projects whilst ***ConScor*** can be used to track the overall performance of contractors over a number of projects. The Benchmarking Framework for Ghanaian contractors, Benchmarking Implementation Model, Project Scoresheet and Contractor Scoresheet respectively were validated in interviews with a select panel of experts from across the broad spectrum of sectors within the Ghanaian construction industry using semi-structured questionnaires. Improvements and modifications were made to the outputs using the feedback received from the validation interviews.

Keywords: Ghana, contractor performance, benchmarking, performance measurement, critical success factors, key performance indicators

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To my dear wife, Linda, my daughters, Shireen, Sabina, Sally-Ann and my son, Simon-Joseph

To Dad, Elizabeth, Abraham and Martha

And to the memory of Ante, Christie and Jacob

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Despite significant progress in performance improvement in the construction industries of many developing countries, the same cannot be said of the industry in Ghana (Ofori, Ai Lin and Tjandra, 2012). The perception of poor performance and underperformance amongst Ghanaian contractors is widespread. This perception is fuelled in part by a high frequency of delayed, abandoned or discontinued projects arising from contractor non-performance. Contracts for most large-scale projects are executed by foreign owned contractors or contractors with foreign backing (Tawiah, 1999). In addition to the above challenges, the quality of finished projects in Ghana is a major issue. Many projects show significant defects within the defects liability period and a poor maintenance culture affects many projects adversely. Many construction Clients in Ghana do not achieve fully their anticipated project objectives. Contractors may not provide adequate health and safety measures for both their employees and the general public. A high incidence of construction-related injuries and fatalities has led to calls by the government for contractors to emulate best-practice examples from more advanced countries to improve safety on construction sites (Abbey, 2012). With the commencement of commercial oil exploration in Ghana, it is important that Ghanaian construction firms are able to consistently deliver excellence both in their products and services to their clients. This will enhance their capacity to compete with international companies and participate actively in the delivery of the large-scale infrastructural platforms associated with the exploration and delivery of oil and related products (Ato Kobbie, 2012).

Whilst there is a case for local contractor participation in the delivery of major infrastructural projects (Ghana News Agency, 2012), this expectation needs to be matched with ample capacity amongst Ghanaian contractors to deliver to the standards of world-class project excellence which major international participants in the oil industry are accustomed to in their home countries. This is particularly significant given the projected upsurge in infrastructural development (MFEP, 2012) and progressive efforts to raise finance for infrastructure development (Agyei, 2012) as a means to meet the huge infrastructure deficit. To address the trend of delays to construction projects, abandoned or discontinued projects, construction related accidents and poor quality of projects in the Ghanaian construction industry calls for innovative solutions. Benchmarking will help expose Ghanaian contractors to new and more effective ways of meeting customer expectations. On-going performance measurement will help to establish the standards of performance amongst Ghanaian contractors. In this sense, there are many lessons which Ghana can learn from the experiences of other countries (Ofori, Ai Lin and Tjandra, 2012).

In this study, the need for improvements in Ghanaian contractor performance, has been established. The study explores the causes of poor performance amongst Ghanaian contractors and the potential of benchmarking as a tool for improving performance to international competitive levels. A benchmarking tool has been developed for Ghanaian contractors. The critical success factors and the key performance indicators for performance improvement amongst Ghanaian contractors are identified. These are incorporated in the benchmarking framework developed. Also developed in this study is a performance measurement tool which can enable third parties to independently assess the performance of Ghanaian contractors.

1.2 RESEARCH PROBLEM

The performance of Ghanaian contractors is a major cause of concern amongst client groups and other stakeholders in the Ghanaian construction industry. Failure to meet performance targets within the Ghanaian construction industry is a common feature. In many instances, contractors are blamed for poor performance and criticised for having limited knowledge in the application of requisite management techniques (Ahadzie, 2008). The larger indigenous contractors are mostly owned by proprietors who have little or no formal knowledge of the construction, project or organisational management. Such proprietors generally do not employ personnel with the technical know-how to manage their firms towards sustainable growth. Management of firms" resources is undertaken haphazardly and therefore does not promote growth (Vulink, 2004). The Ghanaian construction industry has a highly unstable business environment and is characterised by high inflationary trends which negatively affect Ghanaian contractor capital making it increasingly challenging to manage construction firms in Ghana (Dansoh, 2005). There is a general perception in the Ghanaian society of widespread poor and underperformance amongst Ghanaian contractors. The perception of widespread underperformance was confirmed in the findings of a preliminary study to assess the performance of Ghanaian contractors as part of this research. The preliminary study showed poor time predictability, poor cost predictability, low profitability, low productivity and poor business performance amongst Ghanaian contractors.

Widespread underperformance amongst Ghanaian contactors means that a majority of the major projects in Ghana are awarded to very few large firms, mostly foreign owned which have dominated the Ghanaian construction industry since Independence in 1957 (Chileshie and Yirenkyi-Fianko, 2012). Both large and small contractors in Ghana find it difficult accessing finance for projects (Badu et al., 2012). Delays in the payment of contractors for work done are very common and constitute a major cause of delays in the completion of

projects (Adams, 2008). On average construction projects in Ghana record cost overruns of 60% to 180% and time overruns of between 12 and 24 months (Kpamma and Adjei-Kumi, 2010). There is a lack of commitment towards the health and safety of Ghanaian construction workers who work in a generally unsafe environment (Boakye et al., 2010). The effects of these and many other problems which affect Ghanaian contractors is that it is difficult to attract investment into Ghanaian construction firms (GSE, 2012). There are currently no listed construction companies in the Ghana stock exchange and there are no Ghanaian construction firms in the Ghana Club 100 list of prestigious companies which demonstrate excellence in performance (GIPC, 2012).

To improve performance, Ghanaian contractors should both measure their performance and benchmark (Beatham et al., 2004). Performance measurement and benchmarking are the cornerstones in the effort to attain world-class performance (Alarcon et al., 1998). Benchmarking will enhance performance (Hinton et al., 2000) and enable superior performance (Camp, 1989). However the process tends to be expensive and a „lack of relevant conceptual (benchmarking) models is a reason for the reluctance of the construction industry to adopt benchmarking (Mohammed, 1996). Also, both the government and major contractor groups identify the lack of a performance measuring tool for Ghanaian contractors as a major cause of poor project delivery (Amoa-Mensah, 2011). The Ghana government, has in a bid to improve project delivery, expressed the need for a performance measurement tool and a ranking system for contractors as a means of ensuring that projects are awarded only to competent contractors (Baah-Wiredu, 2008). The development of a performance measuring system for Ghanaian contractors will enable third parties to independently assess the performance of contractors and ensure that only the best contractors are awarded contracts.

Improvements in practices and processes are urgently needed to improve overall performance of Ghanaian contractors.

1.3 RESEARCH QUESTIONS

Ofori et al. (2012) argued that despite significant developments in the construction industries in many countries including some in Africa, it appears the Ghanaian construction industry was being left behind. Contractors in the Ghanaian industry are major stakeholders in the drive for excellence in the Ghanaian construction industry and are therefore critical to efforts to improve the overall performance of the Ghanaian construction industry. Contractor performance is critical to the attainment of sustained improvements in overall industry performance. It has been argued that benchmarking helps organisations to deliver better services through continuous improvement (Lam et al., 2004) with the potential to deliver the highest levels of performance improvements (Cooke, 1997). It is "the search for best industry practices that will lead to superior performance" and a continuous process used to measure services, products, and practices against a company‟s toughest competitors or those companies renowned as industry leaders.

To address the objectives of this research, some of the key questions which need to be addressed are:

i. What is the current state of contractor performance in Ghana?

ii. What are the factors which lead to underperformance among Ghanaian contractors?

iii. What are the critical success factors required to achieve significant improvements in contractor performance? iv. What measures should Ghanaian contractors focus on if significant improvements in performance can be attained?

1.4 AIM

The study explores the development of a benchmarking framework and a performance measurement tool which can be used by Ghanaian contractors to improve their performance.

1.5 OBJECTIVES

To achieve the overall aim of the research set out in Section 1.4 above, the objectives of this research are outlined as follows:

Objective 1 Evaluate the need for improvements in the delivery of projects by Ghanaian contractors and establish the factors affecting Ghanaian contractor performance.

Objective 2 Develop a cost-effective benchmarking framework that can be used by underperforming Ghanaian construction companies to measure and benchmark their performance.

Objective 3 Identify the critical success factors (CSFs) for enabling world-class performance in Ghanaian contractors.

Objective 4 Establish a set of key performance indicators (KPIs) for enabling world-class performance amongst Ghanaian contractors.

Objective 5 Develop a system that enables client groups and other third parties to independently assess the capacity and performance of construction contractors.

1.6 STUDY JUSTIFICATION

World-class companies can emulate and surpass the best international companies in their field using world-class techniques (Munroe-Faure & Munroe-Faure, 1992). Construction companies which want to compete at world-class level must develop a truly competitive edge (Chang and Kelly, 1995). They should consistently produce performance which can match or exceed the best-in-class. Benchmarking helps organisations to deliver better services through continuous improvement (Lam et al., 2004). It offers the greatest opportunities for the highest levels of performance improvements (Cooke, 1997) and provides information on what is required for world-class performance (Munroe-Faure & Munroe-Faure, 1992), benchmarking.

This research explores the development of the first Benchmarking Framework for Ghanaian contractors. The framework will facilitate the benchmarking process and enable Ghanaian contractors to improve their performance by exposing them to world-leading standards of performance and how to attain such levels of performance. This study will raise awareness and increase the uptake of benchmarking within the Ghanaian construction industry. It provides the opportunity to introduce Ghanaian contractors to the concept of benchmarking. As part of the dissemination of the findings of this study, Ghanaian contractors will be offered on-going training and support to enable them to incorporate benchmarking and performance measurement into their operations.

The Benchmarking tool developed in this study will be simple to administer and can be used without third-party support. This removes the need for the involvement of third-party bestpractice organisations which is a major constraint to the implementation of benchmarking programmes and will drive down benchmarking costs significantly.

The KPIs identified in this study will simplify the process of choosing what to measure for Ghanaian contractors. This will provide an inexpensive option for Ghanaian contractors who lack the human and financial capacity to implement expensive benchmarking and performance measurement systems.

The suite of CSFs developed in this study will enable Ghanaian contractors new to benchmarking and those with little experience of benchmarking to select the areas to focus benchmarking efforts. Such contractors will be able to implement benchmarking programmes without expensive third-party or consultant involvement.

This research explores the causes of underperformance amongst Ghanaian contractors with a view to identifying and proposing innovative solutions. This will lead to a deeper understanding of the Ghanaian construction industry and the factors which affect contractor performance.

The outputs produced by this study will promote a greater awareness and a deeper understanding of benchmarking and performance measurement. Given the importance of these concepts to performance improvement, this study provides new knowledge to fill a gap within the Ghanaian construction industry.

1.7 THEORETICAL FRAMEWORK

1.7.1 Performance Theories

Performance can be described as the "outputs and outcomes from processes, products and services that permit evaluation and comparison relative to goals, standards, past results and other organisations. Four types of performance may be identified: product and service, customer-focused, financial & marketplace and operational (BNQP, 2008). It is possible for organisations to achieve high scores in every area of practice and performance. Organisations which are the best in their sectors - both in their practices and results - and demonstrate international competitiveness are described as "world-class" organisations (Prabhu, 2000). To achieve international competitiveness in performance, organisations should emulate and surpass the best international companies in their sector (Munro Faure & Munro Faure, 1995). To improve performance, organisations should both measure their performance and benchmark (Beatham et al., 2004). According to Alarcon et al. (1998), performance measurement and benchmarking are cornerstones in the effort to attain world-class performance. Benchmarking and performance measurement are thus seen as critical to efforts at improving performance.

Three (3) theories of Performance Improvement – Psychological Theory, Economic Theory and Systems Theory can be identified. Psychological Theory acknowledges human beings as the brokers of productivity along with their cultural and behavioural nuances. Economic Theory is the primary driver and survival metric of organisations whilst Systems Theory is described as recognising the purposes, pieces and the relationships which are needed to make systems and sub-systems effective. The mere emulation of the practices of successful organisations does not guarantee success. Excellence is the outcome of serious study, reflection and the creation of foundational concepts and theories (Swanson, 1995).

Swanson (1995) alludes to Peters and Waterman (1982)‟s "in Search of Excellence" which identifies forty three (43) "excellent" companies and explores the secrets for their organisational success. Referring to the fact that two-thirds of the so-called excellent companies ceased to be excellent after five (5) years, Swanson (1995) argued that the companies did not possess a key for excellence. The Swanson (1995) argument is flawed by the possibility that losses in performance levels may be due to either related, unrelated factors and external factors which impact on overall performance. It is relevant to explore a set of factors which enhance performance and an alternative set of factors independent of the first set which may be responsible for the failure of organisations. Performance measurement enables organisations to identify areas in their operations where improvements are needed. Comparisons with successful organisations in these areas help organisations to put their own performance into context. Such benchmarking has the potential to improve performance to world-class levels (The Construction Task Force, 1998). Whilst benchmarking presents opportunities for improving the performance of Ghanaian contractors, associated problems such as the identification of suitable partners, identification of comparable data(Hinton et al., 2000) and resource constraints such as time, finance and expertise (Holloway et al., 1997) affect benchmarking implementation and effectiveness. Also much of benchmarking activity is substantially “results” benchmarking as opposed to “process” benchmarking (Hinton et al., 2000) with suggestions that the costs of benchmarking can sometimes outweigh the benefits (Sheridan, 1993) which puts into question the economic justification of benchmarking (Lincoln & Price, 1996).

This study addresses these problems through the cost-effective benchmarking model developed in his study. The study also identifies the critical success factors (CSFs) which are responsible for business success and the key performance indicators (KPIs) for excellence in business. These provide factors and measures which can be used with the Benchmarking Framework by Ghanaian contractors to benchmark their performance.

1.8 SCOPE

The study focuses on improving the performance of Ghanaian construction contractors for whom the benchmarking model developed in the study targets. In the field survey, the largest national contractors in the D1K1 category in Ghana are interviewed. Whilst many previous studies in the Ghanaian construction industry survey D1K1 and D2K2 contractors together, D2K2contractors are not sampled in this study. This is due to the differences in the characteristics between D1K1 and D2K2 contractors which affect their operations and their respective perspectives of issues.

The survey of banks is limited to only Ghanaian Universal Banks. Non-banking financial institutions and rural banks are not sampled. Survey interviews for both contractors and banks were limited to Accra and Kumasi where the head offices are mostly located and there was a higher likelihood of finding senior officers with decision-making responsibility to interview.

1.9 MAIN DELIVERABLES

The research provides an exploration into the general levels of performance within the Ghanaian construction industry. The major causes of underperformance amongst Ghanaian construction firms have been identified together with recommendations for addressing these challenges. The main deliverables of this study are the Benchmarking Framework developed for Ghanaian contractors, the Benchmarking Implementation Model and a Performance Measurement tool for measuring the organisational and project performance of Ghanaian contractors. Also arising from this research, critical success factors (CSFs) which can lead to internationally competitive performance amongst Ghanaian construction firms and key performance indicators (KPIs) relevant to the Ghanaian construction industry have been identified. The CSFs and KPIs have been integrated into the Benchmarking Framework to provide cost effective opportunities for benchmarking.

1.10 STRUCTURE OF THESIS

The thesis is made up of nine (9) chapters which include an introduction, review of relevant literature, methodology and methods used in the research, results of the study and analysis of the results, a discussion of the results, development of the research deliverables, validation of the deliverables and conclusions. The chapter outline for the research is as follows:

Chapter One – Introduction

This describes the subject of this research and context within which the study is undertaken. It explains the key research questions which lead to an outline of the overall aim of the study, the research objectives, methodology and procedure against a background of existing research and scholarship. The chapter concludes with an outline of the structure of the thesis.

Chapter Two – Construction Industry Development

This chapter presents an exploratory review of literature into why the subject of this study merits study. Developments in the global construction industry are reviewed. The chapter benchmarks the Ghanaian construction industry against the United Kingdom (UK) construction industry and explores the commonalities between the experiences in the respective industries of the two countries. The UK construction industry"s development is charted and lessons adapted for the development of the Ghanaian construction industry.

Chapter Three – Performance and Excellence

This chapter reviews literature on all areas relevant to the remaining research questions. The chapter focuses on a review of literature on benchmarking, benchmarking frameworks, critical success factors, performance measures and key performance indicators. It shows how this study relates to the work of others and how existing research and scholarship can be used to address the key research questions of this study.

Chapter Four - Development and validation of research deliverables.

This chapter draws on the existing research and literature reviewed to develop key outputs of this research. Drawing on the strengths and addressing the weaknesses of best practice examples, the Benchmarking Framework for Ghanaian contractors, the Benchmarking

Implementation Model and the Performance Measurement tools – the Contractor Scorecard (***ConScor***) and the Project Scorecard (***ProScor***) for Ghanaian contractors are developed in his chapter.

Chapter Five– Methodology and Methods used for study

This chapter gives a background into the methods generally used in research and the specific methods used in this study to address the research objectives. The chapter presents justification for the methods used in this study and the research design used to address the research questions.

Chapter Six – Results and Analysis of research findings

This chapter presents the results of this study and the analysis of the results. This features the main findings of literature study and the empirical data obtained from the field survey of Ghanaian contractors and banks. The chapter also presents the analysis of the data using statistical methods and SPSS software.

Chapter Seven – Discussion of results

This chapter presents the interpretation of the results and key findings of this study relative to the key research questions. The discussion covers both the findings of the literature review and the field survey to establish if the research questions have been satisfactorily addressed.

Chapter Eight – Validation of research outputs

To test the robustness, usability and usefulness of the key outputs of this study, they were tested using a range of methods, including peer-review and a survey of key stakeholders in the Ghanaian construction industry. This chapter describes the methods used for validation and results obtained from the validation of the key research outputs of his study. The main points and feedback received are highlighted as well as the actions taken to address issues raised in the feedback received.

Chapter Nine - Conclusion and Recommendations

This chapter summarises the main conclusions of the research in relation to the research questions. This describes the implications of this study for Ghanaian contractors and the construction industry in Ghana generally. The chapter presents both general recommendations for the national industry and specific recommendations which directly address the objectives of the research and highlights the next stage of this study and general areas for future research.

CHAPTER TWO

CONSTRUCTION INDUSTRY DEVELOPMENT

2.1 INTRODUCTION

This chapter explores industry developments in the global construction industry. Industry performance improvement programmes are reviewed. The construction industry in the United Kingdom (UK) is selected for closer study and explored to identify lessons which can be applied to improve overall performance of within the Ghanaian construction industry. Through comparisons with the UK construction industry, lessons and strategies for improving the Ghanaian construction industry are identified.

2.2 CONSTRUCTION INDUSTRY DEVELOPMENT

The failure to achieve appropriate Quality of Construction is a global problem (FIDIC, 2006). There is widespread concern that the industry as a whole is underachieving (The Construction Task Force, 1998). Many countries in the developed world have initiated programmes to improve the performance of their construction industries. These include Australia‟s "Building for Growth, Building and Construction Industries Actions Agenda" of 1999, Finland‟s "Reengineering the Construction Process Using Information Technology" from 1997 – 2002, Japan‟s "Future Directions of the Construction Industry" programme of 1998 and Singapore‟s "Construction 21". Others examples include South Africa‟s "Creating an Enabling Environment for Reconstruction, Growth and Development in the Construction Industry" campaign of 1997, the "National Construction Goals" in the United States of America (USA) and in Northern Ireland, "Building our future together" and "Achieving Excellence in Construction" (AEC) of 1997 and 1999 respectively (DFPNI, 2007).

2.2.1 The UK Construction Industry

In 2009, there were 194,025 construction firms in the UK comprising of 44,835 main trades construction firms and other trades making up the rest. Amongst the main trades firms, there were 10,629 non-residential construction firms, 27,791 house-builders and 6,415 civil engineering firms. The majority of UK construction firms are small scale with fewer than 20 employees. The 2009 data shows more than a third of all construction firms in the UK had only one employee (75,382 firms) and more than two-thirds (136,007) had between two and three employees. Altogether, 94.5% had between one and thirteen employees, 5.8% employed 14 to 79 people. The larger construction firms (more than 80 employees) made up 0.67% with less than 0.2% employing more than 300 (ONS, 2011).

NAO (2000) identifies four major barriers to improving construction performance in the UK construction industry: procurement, problems associated with briefing and specification, design and planning and project management. Contractors, consultants and other industry players underbid as a means to obtain jobs owing to the overdependence on cost as the basis for procuring construction and related services. Poor briefing and definition of project requirements with insufficient focus on user needs and the functionality of the construction is also a problem. Problems relating to design and planning include little integration of design and construction, contractors not involved in the design process, limited use of value management and limited use of standardisation and prefabrication affect the overall management of projects leading to dissatisfaction among clients (NAO, 2000). In comparison with other industries in the UK and at the global level, the performance of UK construction firms generally lags behind the performance of the global leaders. UK Construction firms lag behind in productivity, profitability, value-added, investment in Research and Development (R&D) and capital investment (DBIS, 2009).

Despite the challenges the UK construction industry faces, there are several positives which promote the industry‟s output. For example, the construction sector in the UK receives substantial support from banks such as property development loans, mortgages for property purchases which make up about half of all corporate lending and provision for loan defaults with more than a fifth of commercial property borrowers breaching the terms of their loans or falling behind in their repayments (Duke, 2011). The availability of finance contributes largely to a vibrant property sector which contributes significantly to overall industry performance. The UK industry as a whole demonstrates a commitment to improvement as seen in the numerous industry initiatives and reports commissioned to investigate the problems relating to performance within the industry which through the years have led to the establishment of industry bodies which have addressed issues relating to the UK Construction Industry. Some of the major developments in the UK construction industry are discussed in the next section.

2.2.1.1 UK Construction Industry Development

Performance in the UK Construction Industry has been a cause of concern at both the government and industry levels for more than half a century. A succession of industry reports have been initiated by successive governments in the UK aimed at improving the construction process and output. These include the Emerson Report of 1962, the Banwell Report in 1964 and the Simon Report of 1994 (Murray and Langford, 2003). In recent times however, the three most significant reviews are Latham (1994)‟s *constructing the Team*, The Levene Report and Egan‟s *Rethinking Construction* Report (NAO, 2001).

The most recent industry report, the Egan Report describes the UK Construction industry as having a low and unreliable rate of profitability with little investment in research and development and low levels of capital. The report faults traditional procurement systems which equate price to quality by selecting contractors and designers exclusively on the basis of tendered price and identifies a "crisis in training" (The Construction Task Force, 1998). In the case of training, it is reported that between 1994 and 1998, applications for construction related courses run by Universities for professional staff fell by 26 per cent (NAO, 2001).

Egan‟s Rethinking Construction Report built on the Latham Report (Latham, 2004) and recommends amongst other things that the UK construction industry learns from the experiences of industries such as the manufacturing and automobile industries that have achieved world-class excellence, measure performance and set challenging targets. Some of the major problems associated with the UK construction industry are profitability, investment in research and development (R&D) and low capital investment (DETR, 1998). The UK construction industry is described as one with low, unreliable profits, very low margins and characterised by falling R&D investments which damage the industry‟s ability to keep abreast of innovation in processes and technology. The UK construction industry is generally viewed as a poor avenue for investment by the UK investment community owing to its unpredictability and lack of competitiveness (DETR, 1998). The industry is only competitive on price and not quality with too few barriers for poor performers thus making investors unable to identify brands among companies to which to attach future value. The result of this is that there are few strategic, long term shareholders in listed construction companies (Construction Task Force, 1998).

2.2.1.2 The Construction Industry Council (CIC)

In the UK, the Construction Industry Council (CIC) is the representative forum for professional bodies, research organisations and specialist business associations in the construction industry. Established in 1988, the Council provides a single voice for professionals in all sectors of the UK built environment through its collective membership of more than 500,000 individual professionals and 25,000 firms of construction consultants. CIC also represents the views of professionals and other high level managerial and technical personnel in the industry. Membership of the CIC is open to organisations which fulfil the requirements of membership: and may be admitted into one of three categories of membership as follows: Full Membership, Associate Membership and Honorary Affiliate Membership. Full Membership of CIC is open to Professional Institutions whose members are actively involved in planning, procuring, designing, constructing, regulating, maintaining or managing the built environment; either holding a Royal Charter or with independent status; and qualifying individuals in any of these various disciplines(CIC, 2012). Also, associations which represent professional and specialist services, research and/or education organisations that serve the built environment, the construction industry and its clients and other organisations that are primarily concerned with quality, regulation, registration and standards within the built environment. Organisations within the construction industry which speak for defined groups but are not eligible for admission as full members of Council, may be admitted as Associate Members whilst Honorary Membership may be conferred on individuals who have made substantial contributions to the construction industry (CIC, 2012).

Following Latham‟s Report of 1994, 'Constructing the Team' and Sir John Egan‟s „Rethinking Construction' Report in 1998, several cross-industry bodies were established to lead the agenda for change in the UK construction industry. Amongst them were:

- The Construction Industry Board;
- Reading Construction Forum;
- Design Build Foundation;
- Construction Best Practice Programme;
- Movement for Innovation;
- Government Construction Clients Panel;
- The Housing Forum;
- Local Government Task Force;
- Rethinking Construction;
- BE;
- Constructing Excellence; and
- Construction Clients' Group.
- Considerate Constructors Scheme

(Source: Constructing Excellence, 2011)

The UK Construction Industry Board (CIB) was established in 1995 as a response to the

Latham Report recommendations. It started with representatives from five „umbrella' bodies with the Minister for Construction as President. Other members included specialised trade body federations and professional bodies representing contractors, sub-contractors, professionals, materials suppliers and construction clients (SCRI, 2011).

The Reading Construction Forum developed guidance on partnering in construction about the same time as the Construction Best Practice Programme (CBPP) was established and the associated IT Construction Best Practice (ITCBP) was created to provide guidance and advice to UK construction firms and client organisations which desired to gain the knowledge and skills required to implement change within their organisations. Also, the Design and Build Foundation (DBF) was launched to catalyse change and bring together forwardthinking construction industry stakeholders such as designers, contractors, consultants, specialists and manufacturers representing the entire construction supply chain (SCRI, 2011). Following the Egan Report, *Re-thinking construction*, Movement for Innovation (M4I) and the representative body for clients, the Construction Clients Federation were established. This was done at the same time as focused sector groups such as the Local Government Task Force, the Housing Forum and the Government Clients Panel.

The Considerate Constructors Scheme (CCS)

The Considerate Constructors Scheme was set up by the UK construction industry to improve the industry‟s image. It is open to all types and sizes of construction companies and sites in the UK. Following the Latham Report of 1994, the Construction Industry Council formed the Latham Review Implementation Forum arising from whose work the Considerate Constructors Scheme (CCS) was created. In 1996, a steering group was formed which took over the implementation of the new scheme and developed a Code of Considerate Practice which commits member companies and sites registered with the Scheme to respect the community, protect the environment, secure everyone's safety, care about appearance and value their workforce. Formally launched in 1997, the CCS allows all Construction sites and companies operating within the UK to register with the Scheme and are monitored regularly. Currently there are more than 500 UK construction firms and over 60,000 construction sits registered under the scheme.

2.2.1.3 Movement for Innovation (M4I)

M4I was established by the UK construction industry working with Government in 1998 as a response to Egan‟s Rethinking Construction Report. M4I led a radical programme for improvement in the UK construction industry (Rethinking Construction, 2001) targeting improvements in overall value for money, profitability, reliability and respect for people, through demonstration of best practice and innovation (Constructing Excellence, 2011).

M4I adopted a benchmarking approach using projects which showcased innovation and excellence. Benchmarking was deemed to be an essential prerequisite to any change efforts. The pool of projects was submitted by construction clients and contractors who demonstrated a commitment to innovation in the delivery of their projects and benchmark their performance against the best-in-class using the industry-wide headline KPIs. Demonstration Projects show evidence of the benefits of best practice measures and innovation in practice. Organisations which benchmark against best practice organisations, learn from and are able to emulate them will improve and eventually be ranked among the best (Constructing Excellence, 2011).

M4I used four avenues – product development, project implementation, partnering the supply chain and production of components –in the pursuit of innovation and change and aimed at achieving ambitious targets of: 10% reduction in cost and time, 20% reduction in defects and accidents, 10% increase in productivity and profitability and 20% increase in predictability and project performance (Constructing Excellence, 2011).

As the same time as M4I was established, the **Housing Forum** was set up in 1999 to lead the movement for change and innovation within the house-building sector by mobilising the M4I players from the house-building sector. Among the Housing Forum‟s early achievements were the establishment of the National Demonstration Projects Programme. A Benchmarking Club to monitor and evaluate progress within the construction industry against the *Rethinking Construction* targets was set up to improve performance, productivity and profitability within the industry. The Benchmarking Club set up by the Housing Forum also pioneered the first national Customer Satisfaction Survey of major of house builders within the private sector. The Housing Forum produces industry- based practical guidance and works to promote improvements in housing. It provides up to date industry knowledge for the housing sector through regular conferences (Housing Forum, 2011).

As a follow-up to the Housing Forum, The Local Government Task Force (LGTF) was established in March 2000. This was set up to enhance the uptake of the principles of Rethinking Construction by local authorities. LGTF has established different working groups which focus on issues critical to the Rethinking Construction message. Generally it works to promote the Rethinking Construction Agenda within local authorities by developing the recommendations of the Rethinking Construction Report.

2.2.1.4 The Strategic Forum for Construction

The Strategic Forum provides a platform for all parties within the UK construction industry to discuss strategic issues facing construction within UK and explore common solutions to these issues. Established in 2002, the Forum acts as an interface between the Government and the construction sector. It has six (6) representative groups which represent key stakeholders within the sector. Clients, professionals and contractors are represented on the Strategic Forum by the Construction Clients Group, the Construction Industry Council and the UK Contractors Group and the Construction Alliance respectively. Specialist contractors, product suppliers and site workers are represented by the National Specialist Contractors Council and Specialist Engineering Contractors Group, Construction Products Association and the Union of Construction, Allied Trades and Technicians (UCATT) respectively. The Forum seeks to enhance performance in procurement and integration, **c**ommitment to people**,** client leadership, sustainability, design quality and health and safety (Strategic Forum, 2011).

2.2.1.5 Consolidation of the UK Construction Industry development process

To streamline initiatives arising from *Rethinking Construction, Rethinking Construction* Ltd was established in April 2002. This brought together the different streams under the change agenda and acted as the focal point for co-ordinating the change and innovation agenda. As a follow-up to this, all cross-industry bodies were grouped into one unifying body Constructing Excellence in 2003. Constructing Excellence is a powerful, representative and influential voice for improvement in the built environment sector within UK. This was done as a means to streamline the efforts of all the respective organisations involved in the agenda for change in the UK construction industry (Constructing Excellence, 2011).As part of the consolidation process, the DBF and the Reading Construction Forum merged in 2002 to form Built Environment (*Be)*, a new supply chain body. M4I and the Construction Best Practice Programme merged in 2003 to form Constructing Excellence and then in 2005, Constructing Excellence and *Be* merged (SCRI, 2011).

2.2.1.6 Demonstration Projects

As part of the recommendations of Egan‟s Rethinking Construction Report, the Constructing Excellence Demonstration Programme was established in 1998. The Demonstration projects were at the core of *Rethinking Construction* and presented projects which represented innovation in action to support the need for change within the construction industry. KPIs were measured for projects selected for the Demonstration Projects programme and shared with the entire industry to raise awareness about the need for change within the industry (Constructing Excellence, 2010). The Demonstration Projects provided the opportunity for construction firms at the leading edge of innovation to showcase site-based or organisationwide projects demonstrating innovation and excellence which could be measured and evaluated (DETR, 2001). Both Constructing Excellence and the Housing Forum have their own sets of Demonstration Projects. The Housing Forum„s Demonstration Projects are projects which highlight learning and good practice throughout the supply chain in the housing construction sector. These are live projects that show evidence of innovation or projects which apply an element of best practice envisaged to lead to a step-change in performance for the participating organisations. Organisations involved in these Demonstration projects make a commitment to learning and sharing from, and with, each other. They are also able to take part in communities of best practice which bring together like-minded individuals from across various different Demonstrations (Housing Forum, 2011).

2.2.1.7 UK Top Contractor profiles

Both Construction News (2009) and The Construction Index (2010) feature the same top 5 contractors in their rankings. Balfour Beatty leads both lists followed by Carillion, Laing O‟Rourke, Morgan Sindall and Kier. Brief details of the profiles of top UK contractors are discussed in the next section.

Generally, the topmost UK contractors have diversified their activities into several interrelated sectors. Leading UK contractor, Balfour Beatty operates in four areas: professional services, construction services, support services and infrastructure investments.

Balfour Beatty"s professional services include the provision of programme and project management services, architectural services, project design, planning and consulting services. Construction services include building, design, construction management, refurbishment and fit-out, mechanical and electrical services, civil engineering, ground engineering and rail engineering. The company"s support services comprise facilities management and business services outsourcing; upgrade and maintenance of water, gas and electricity networks; highways network management, operation and maintenance; and rail renewals whilst infrastructure developments include a portfolio of long-term PPP concessions in the UK, primarily in the education, health and roads/street lighting sectors (Balfour Beatty, 2011).

Carillion Plc."s operations include the development of rail infrastructure, highway maintenance, civil engineering works, building works, property services, recruitment, defence, education, facilities management, planned maintenance, fleet management, developments and private finance. Carillion is involved in the maintenance of more than 20% of UKs motorways and major roads in addition to the provision of coastal flood defences, land remediation, piling and transport improvements to industrial projects. Carillion"s property services involve a one-stop provision incorporating fabric maintenance and project fit-out. The company is involved in the UK education sector building schools, facilities for sports and extended school activities. Its involvement in the defence sector involves the provision of essential infrastructure for servicemen and in the health sector; Carillion integrates finance solutions in the provision of health infrastructure (Carillion Plc., 2011).

Carillion‟s service delivery operations include the provision of asset management and service delivery solutions, comprehensive planning, engineering, architectural design, 3-D Modelling and project management services to both public sector and commercial customers. The company is involved in the planning and financing and management of developments including an extensive portfolio of retail, commercial and industrial property developments and describes itself as a pioneer in PPPs and PFI (Carillion Plc., 2011). Carillion‟s foreign operations include projects in the Caribbean and Canada where it delivers a full range of the company‟s capability in Highway maintenance, construction services, facilities management and PPPs. It has extensive operations in the Middle East and North Africa. The company‟s joint ventures in Oman, Dubai, and Abu Dhabi make it a Regional leader in design, construction, facilities management and maintenance services (Carillion Plc., 2011).

The review of the profiles of the top UK contractors shows that they have diverse operations across different business sectors and in different geographical locations. The lessons for other contractors aiming to improve their performance are the need to diversify their product offerings in different geographical locations outside of their home regions.

2.2.1.8 Procurement in the UK Construction Industry

The three main procurement routes recommended for use in the UK are; PFI, Design and Build and Prime Contracting (NAO, 2001).NAO (2001) defines PPP /PFI as a procurement type in which a supplier is contracted not only to construct a facility such as a road or prison, but also to deliver the services which the facility is intended to provide. Risks associated with providing the service are transferred to those best able to manage them. The outputs which the service is intended to deliver must be clearly defined.

In design and build, a single supplier is responsible for both design and construction of a facility. Clients have to specify the type of building they require in terms of the required outputs and services with the contractor proposing the best design to meet this (NAO, 2001).

Prime Contracting involves the appointment through competition of a Prime Contractor with a well-established supply chain of reliable suppliers of quality products. The Prime Contractor integrates the supply chain into the design process, co-ordinates and project manages all activities throughout the design and construction stages to provide a facility fit for the specified purpose and which meets predicted life-cycle costs (NAO, 2001).

2.2.1.9 Housing provision in the UK

Housing in the UK was previously mainly provided by the state. However, there has been a progressive transfer of social housing from government control into private hands, started between the period of 1981-1989 when some 2 million social houses were sold at huge discounts of up to 70% below market prices (ukhousingpolicy.org; accessed 18/06/2012).The policy shift continued with the transfer of the ownership and management of social housing from local authorities to the registered social landlords sector and PFI schemes starting in 1998. By 2002, more than 600,000 public owned residential property units had been transferred in 151 schemes requiring 9.8bn in private finance with an average of 200,000 units transferred a year. Local authorities employed three options in the transfer of ownership and management to the private sector. These included the PFI system, the use of management companies and large-scale voluntary transfers (LSVTs). The last option - the most popular option - involves ownership and management transfer of public sector housing from local authorities to not-for-profit independent Registered Social Landlords (RSLs) private sector finance (Davis Langdon, 2012).

2.2.2 The Ghanaian Construction Industry

The Ghanaian construction industry derives its practice from the British construction industry (Ahadzie, 2008). It is the backbone of the Ghanaian economy contributing about 8.5% to the overall Gross Domestic Product (GDP) and employing 2.3% of the active population (Ankomah et al., 2010). Ghana"s Ministry of Works and Housing (MOWH) has over 20,000 "building contractors" on its register which is relatively large given the "size" of the economy (Ayisi, 2000). Data from the Ministry of Works and Housing puts the figure in 2010 at about 34,000 registered contractors. Like the UK industry, the Ghanaian construction industry presents few barriers to entry thus allowing individuals and business entities without the requisite qualifications, personnel or resources to register as contractors. The Ministry of Road and Highways (MRH) and the Ministry of Works and Housing (MWH) are responsible for the policies that have an effect on the construction industry in Ghana (Vulink, 2004). Both Ministries are responsible for the registration and classification of contractors – road contractors by the former and building and civil engineering contractors by the latter respectively. However neither ministry has a monitoring or regulatory function with respect to contractor performance. All Ghanaian contractors are required to register with the Registrar General"s Department with a requirement to submit annual returns. This requirement is however not strictly enforced and there are no published sanctions for noncompliance.

The performance of Ghanaian contractors is a major cause of concern amongst client groups and other stakeholders in the Ghanaian construction industry. Many Ghanaian contractors fail to meet performance targets (Ahadzie, 2008) and are generally blamed when projects go wrong. They are also criticised for having limited knowledge in the application of requisite management techniques. In many Ghanaian contractors, the management of the firms" resources –labour, finances, materials, plant and equipment in Ghanaian construction firms is carried out haphazardly and therefore does not promote growth (Vulink, 2004).Many of proprietors who head even the larger Ghanaian owned construction firms have little or no knowledge in the construction industry (Tawiah, 1999). The Ghanaian construction industry has a highly unstable business environment with high inflation. This devalues the capital of contractors and together with other challenges, makes it increasingly difficult to manage construction businesses (Dansoh, 2005). Most major projects in Ghana are awarded to the very few large firms mostly foreign owned (Vulink, 2004) due to the inability of Ghanaian firms to compete with international organisations.

A major feature of the Ghanaian construction environment is the separation between design and construction with professionals tending to operate independently with allegiance to their respective professional bodies such as Ghana Institution of Architects (GIA), Ghana Institution of Engineers (GhIE) and Ghana Institution of Surveyors (GIS). As a result, the adversarial relationships which traditionally characterises the construction industry are also very prominent in the Ghanaian industry (Ahadzie, 2007). There is however an evolving process of organising and action towards the formation of industry-wide contractor representative groups and an industry regulator (Ghana News Agency, 2012).

The Ghanaian construction industry is very important to the overall national economy contributing about 4.2% to GDP (Ahadzie, 2007). A widespread culture of underperformance means that a majority of the major projects in Ghana are awarded to very few large firms which are mostly foreign owned (Tawiah, 1999).With a weak infrastructure base, much of the existing infrastructure stock is generally aged and in need of renewal. Much of Ghana‟s infrastructure was built in the early 20th century to support colonial administration and has not been updated since. For instance, the railway network is deplorable and inadequate and exists in only three

(3) out of ten (10) regions. The most recent development of public services took place in the 1950s on attainment of independence. This reflects the poor quality of public services available. Ofori (2012) explored the problems which affected Ghanaian construction firms including both contracting and consultancy firms faced. Those identified as affecting the contracting firms include the inability to secure adequate working capital, inadequate management, insufficient engineering capacity and poor workmanship.

Laryea (2010) used the case study method to explore the challenges and opportunities which Ghanaian contractors face. The study involved detailed interviews and discussions with selected Ghanaian Building and Civil Engineering firms and Road Contractors. The challenges identified by Laryea (2010) as facing Building and Civil Engineering Contractors were: finance, payment delays, poor design quality, personnel issues, bribery and corruption and poor contractor classification and low workloads. Amongst the Road contractors, the problems identified by Laryea (2010) were: issues relating to funding and finance such as poor access to credit, delays in payment from government and government agencies, cumbersome payment processes, inability to compete in the competitive system of procurement, lack of capacity to compete with foreign owned firms and fragmentation of contractor representation bodies. The rest are low technology, inadequate supervision of contracts, poor preparation for projects, revision of bills of quantities, politicisation of the contract bidding process and a lack of effective barriers to entry. Put together, the problems identified by Laryea (2010) as facing the Ghanaian construction industry are as follows:

- Poor leadership and management of construction firms;
- Poor access to credit;
- Delays in payment from government and government agencies;

- Cumbersome payment processes;
- Inability to compete in the competitive system of procurement;
- Lack of capacity to compete with foreign owned firms;
- Personnel issues;
- Low workloads;
- Bribery and corruption
- Low technology;
- Inadequate supervision of contracts
- Poor preparation for projects;
- Revision of bills of quantities;
- Politicisation of the contract bidding process; and Lack of effective barriers to entry.

Fundamental to the problems affecting the Ghanaian contractors are issues relating to funding and access to finance by contractors. These appear intrinsically linked to many of the other problems that the contractors face. Whilst improved access to finance and cashflow issues cannot be seen as a panacea to the problems which Ghanaian construction firms face, addressing these will provide an impetus to solving many of problems which Ghanaian contractors face. Improving access to finance and cashflow for Ghanaian construction firms will provide the contractors with opportunities to select the types of projects to participate in. The experiences and progress made in many countries including some African countries offers opportunities for the Ghanaian construction industry to learn from and improve performance (Ofori, Ai Lin and Tjandra, 2012).

2.2.2.1 Classification of Ghanaian contractors

Ghanaian construction firms are categorized into four financial classes by the Ministry of Works and Housing according to the size of individual projects they can bid for and the maximum value of work allowed at any time (Dansoh, 2005). Building contractors usually have joint D and K categories enabling them to undertake building works and civil works.

The categories of contractors for building and civil works contractors are shown in table 2.1.

Table 2.1 Classification of Ghanaian Contractors

Financial Class	Contractor Designation	Financial Limit of Projects
1	D1 K 1	No limit
2	D2 K 2	US$ 500,000
3	D3K3	US$200,000
4	D4K4	US$ 75,000

(Source: GHIS, 2006)

Summary

This chapter explored industry developments in the global construction industry. Industry performance improvement programmes are reviewed. The construction industry in the UK was selected for closer study and contrasted with the Ghanaian industry. Whilst acknowledging clear differences in the industry structures of the two countries as well as socio-cultural and political differences, there are generic lessons which can be adapted and applied to improve overall performance within the Ghanaian construction industry through comparisons with the UK construction industry. In particular the different stages of the developments in the UK industry present a blueprint for emulation in Ghana. This is enhanced further by the similarities between the two industries in the two countries arising from the historical links between them.

CHAPTER THREE

PERFORMANCE AND EXCELLENCE

3.1 INTRODUCTION

This section presents a review of literature on performance and performance improvement. Theories underpinning performance and performance improvement are explored. Models and programmes for improving performance are reviewed. The key features associated with performance excellence including the critical success factors and measures of performance are reviewed. Benchmarking frameworks and models have been explored in this chapter. The weaknesses of the existing benchmarking frameworks have been analysed. Also reviewed in this chapter are some of the popular performance measurement tools used globally. The weaknesses of the performance measurement tools have been reviewed to draw useful lessons which informed the development of a model for Ghanaian contractors. Again a general review of literature on key performance indicators has been undertaken for a broad range of industries including the construction industry and construction products KPIs.

3.2 PERFORMANCE

3.2.1 Definition of performance

Several definitions of "performance" have been proposed in the literature reviewed. It has been described as the valued productive output of a system in the form of goods and services with units of performance describing the actual fulfilment of the goods and services relating to performance and measured in terms of features of production, quality, quantity and / or time (Swanson, 1995). Salaheldin (2009) defines performance as the degree to which an operation fulfils primary measures (performance objectives) in order to meet the needs of the customers (secondary measures). Ahadzie (2008) defines it as the behavioural competencies that are relevant to achieving the goals of project-based organisations.

The key themes in much of the review on the definitions of performance describe the concept in terms of achievement and fulfilment arising from an operation in relation to set goals. For example, the Baldridge National Quality Programme, BNQP (2009) describes performance as *"outputs and outcomes from processes, products and services that permit evaluation and comparison relative to goals, standards, past results, and other organisations*". BNQP (2008) identifies four (4) types of performance: product and service, customer-focused, financial & marketplace and operational. In this classification, product and service performance refers to performance relative to measures and indicators of product and service characteristics important to customers whilst customer-focused performance refers to performance relative to measures and indicators of customer perceptions, reactions and behaviours. Financial performance on the other hand describes performance relative to measures of cost, revenue and market position including asset utilization, asset growth and market share and operational performance refers to workforce, leadership, organisational and ethical performance relative to effectiveness, efficiency and accountability measures and indicators (BNQP, 2008).

There is a level of performance where organisations achieve high scores in every area of practice and performance. Organisations which achieve his level of performance are the best in their sectors both in their practices and their results and are described as "world-class" organisations (Prabhu, 2000). To achieve international competitiveness in performance, organisations should emulate and surpass the best international companies in their sector (Munro Faure and Munro Faure, 1995). To improve performance, organisations should both measure their performance and benchmark **(**Beatham et al., 2004), underscoring the importance of performance measurement and benchmarking as cornerstones to attaining of world-class performance. Benchmarking is thus seen as critical to efforts at improving performance (Alarcon e al., 1998). In this study, three (3) theories of Performance Improvement have been identified – Psychological Theory, Economic Theory and Systems Theory. Psychological Theory is said to acknowledge human beings as the brokers of productivity along with their cultural and behavioural nuances. Economic Theory is described as being the primary driver and survival metric of organisations whilst Systems Theory is described as recognising the purposes, pieces and the relationships which are needed to make systems and sub-systems effective (Swanson, 1995).

3.2.2 Performance of Best-in-Class Organisations

The Construction Task Force (1998) described the levels of performance achieved by the best organizations in key performance areas. Amongst the best companies, average reductions of between 6 and 14% in capital cost year on year with the highest being 40% reduction year-on –year are achievable. Such companies are regularly able to achieve 10% – 15% reduction in construction time, 20% increases on average in the number of projects completed on time and within cost and predictability rates regularly exceeding 95%. World-class organisations are also able to achieve as a minimum 30% annual reductions in project time zero defects, 50% - 60% reductions in accident rates in two years or less, 10% to 15% gains in productivity per year and 10% to 20% increases in turnover and profits year on year and 65% decrease in absenteeism (The Construction Task Force, 1998).

3.2.3 Definition of world-class companies

A world-class organization is one that has competitive production and / or service capability at a global level (McDonald et al., 2002). To achieve world-class status, organisations have to closely examine their operations, processes and their customers, compare themselves with the best-in-class, emulate and surpass the best international companies in their field using worldclass techniques (Munroe-Faure & Munroe-Faure, 1992). These enterprises are not merely leaders in their field; they are recognized as the best or better than their competitors - and they strive to sustain this status (Hodgetts, Luthan and Lee, 1994). They achieve high scores in every area of practice and performance and are the best in their sectors both in their practices and results (Prabhu, 2000). To improve performance, organisations should both measure their performance and benchmark **(**Beatham et al., 2004). According to Alarcon et al. (1998), performance measurement and benchmarking are cornerstones in the effort to attain world-class performance.

3.2.4 Performance Measurement

Performance Measurement is the process of quantifying the efficiency and effectiveness of action (Sousa et al., 2006). It is a critical factor for effective management since *without measuring something; it is difficult to improve it"* (Salaheldin, 2009). A lack of effective performance measurement systems hinders efforts to improve performance (Robson, 2004). This supports the assertion "what gets measured gets done", providing a justification for measurement by organisations.

In this work, Performance Measurement has been defined as the process of measuring the outputs arising from actions which organisations take as a means to improve performance.

Performance measurement however does not automatically result in improved performance. To achieve effective performance measurement, a set of critical failure indicators (Robson, 2004), described by Deros et al. (2006) as critical success factors must be. The ideal future or customer requirements (Robson, 2004) thus become the measures and indicators of performance excellence which are used to determine the appropriate success factors.

Performance measurement is integral to performance management and provides a basis for performance improvement programmes. It provides a basis for data which can be collected for analysis for use in making effective business decisions leading to improved business performance and providing the basis for business-related expenditures and measuring progress vis-a-vis organisational objectives. Performance measurement provides the framework which can be used for analysing business improvement efforts (Artley and Stroh, 2001). It helps to garner feedback in respect of organisational goals and provides a framework for the achievement of organisational goals. If performance measurement is deployed effectively, it helps to put an organisation‟s progress into context relative to a set of objectives providing a better understanding of business performance (Kotelnikov, 2008).

3.2.5 Performance measures and performance indicators

A *Performance Measure* is a metric which is used for quantifying the efficiency and effectiveness of action (Sousa et al., 2006). There are short-term metrics as short-term measures which have to be continually calculated and reviewed (Zaire, 2008). In effect, performance measures may be described as short term measures which may be calculated or reviewed to provide an indication of performance. BNQP (2008) does not distinguish between "measures and indicators" describing both as numerical information used to quantify the input, output and performance dimensions of processes, products, programmes, projects, services and the overall outcomes of an organisation. According to BNQP, (2008), "measures and indicators" may be simple (derived from a single measurement) or composite. Performance measures provide a mechanism for relating product or process improvement policies developed by senior management to action at a local organisational level (Bond, 1999). In some cases, "indicator" is used when the measurement relates to performance but is not a direct measure of such performance and also when the measurement is a predictor ("leading indicator") of some significant performance (BNQP, 2008). In other situations, *performance indicators* are used as a representation for absolute measures of performance recorded by organisations as against perception measures which are obtained directly from service users and other stakeholders (Moullin, 2004).

3.3 PRODUCTIVITY

This is the ratio of what is produced by an operation or process to what is required to produce it. It is the ratio of the actual output to input over a period of time (Johnston and Jones, 2003). In the manufacturing context, Kaplan and Cooper (1998) described Productivity as a comparison of the physical inputs to a factory with the outputs from the factory. Whilst there are several existing definitions for productivity, it can be described as an umbrella term which describes the terms utilisation, efficiency, effectiveness, quality, predictability and other performance dimensions. An operation may be described as being productive if it has lower costs (Johnston and Jones, 2003). Improving productivity is very important for firms which want to achieve cost and quality advantages over competitors (Tangen, 2005).

According to Tangen (2005), increased productivity may be demonstrated:

i. When output increases faster than input, i.e. the increase in input is proportionately less than the cost of output (managed growth).
ii. When there is more output from the same input (working smarter).
iii. More output with a reduction of input (the ideal). iv. Where the same output is achieved with fewer input (greater efficiency.

v. When output decreases but input decreases more and the decrease in input is proportionately higher than the decrease in output (managed decline).

Johnston and Jones (2003) described three reasons which can make it difficult to clearly define what Productivity is:

i. In some cases, outputs may be expressed in different forms from the inputs; ii. Ratios may tell very little about actual performance unless comparisons are made with a benchmark; and iii. There are several different ratios which can be used to represent productivity.

Productivity is not synonymous with production thus increased production does not necessarily amount to increased productivity (Tangen 2005). It is a multi-dimensional term whose meaning is determined by the particular context in which it is used (Sumanth, 1994). Firms seeking to improve their productivity adopt a working definition of what constitutes productivity. In practice, the transformation processes in a firm may be fed with several different types of input such as labour, capital, material and energy. The corresponding output may be more than one which makes the calculation of productivity difficult.

3.4 PROFITABILITY

Profitability is the ratio of revenue to cost (or profits to assets). It is the overriding goal for the success and growth of any business (Tangen, 2005). Whilst increased productivity may not necessarily lead to increased profitability in the short term, profitability will be impacted in the long term by the effect of improved productivity (Tangen, 2002). Tangen (2005) expresses profitability mathematically as follows:

Profitability = Productivity + Price Recovery

Where Price Recovery = unit prices / unit costs,

If Productivity = output quantities / input quantities

Then Profitability = output quantities / input quantities + unit prices / unit costs

From the equations above, a Company‟s profitability is seen as a function of its productivity, unit prices and unit costs (also of output quantities and input quantities from definition of productivity). Therefore some of the priorities for increasing profitability are: increasing output quantities, decreasing input costs, increasing unit prices and decreasing unit costs. It is possible to focus on multiple outputs which should not be restricted to products alone but can be extended to cover the service elements. For example, contractors should not focus only on the construction product but also on the service which the customer receives.

3.5 PERFORMANCE

Tangen (2005) described Performance as an umbrella term for all concepts which consider the success of a company such as quality, dependability, speed and flexibility. High performance organisations, according to Slack et al. (2001), demonstrate amongst others:

i. High quality operations which do not waste time re-doing things; ii. Fast operations with reduced in-process inventory between micro operations and reduced administrative overheads; iii. Dependable operations which deliver as planned and eliminate disruption; iv. Flexible operations which adapt to change without disrupting operations; and

v. Low cost operations resulting in higher profits.

The main objectives for performance are thus expressed as: cost, dependability, flexibility, quality and speed. Tangen (2005) uses the “triple P-model” (fig. 3.1) with productivity at the core followed by profitability. Performance is an umbrella term for excellence and includes both productivity and profitability and other non-cost factors such as quality, speed, delivery and flexibility. Profitability can change for reasons that have little to do with productivity (Tangen, 2005) such as inflation, a surge in demand for product and unpredictable abnormal changes in global economic conditions. Increases in productivity in the short term may not result in improved profits but will be seen in terms of long term profitability (Tangen, 2002).

Quality, delivery, speed and flexibility

Performance

Price factors

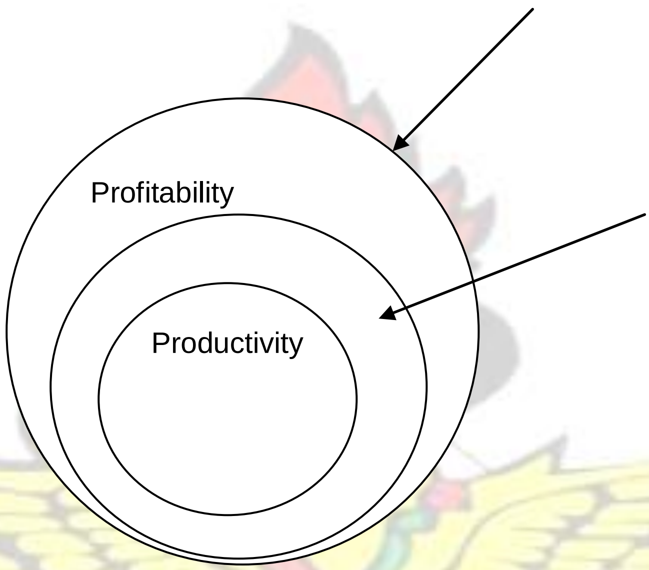


Figure. 3.1 Triple-P Model **Source: Tangen (2005)**

Contractors can thus improve their profitability by strategically improving their productivity. This will not be attained simply by increasing production (Tangen, 2005) but through the provision of good quality products, minimising waste and eliminating re-work. Whilst cost and speed of project delivery are key performance objectives of clients, these should not be achieved at the expense of quality (Xiao and Proverbs, 2002).

3.6 BENCHMARKING

3.6.1 Definition of benchmarking

There are several definitions of benchmarking but the most common definition of benchmarking is Camp (1989)‟s definition which describes benchmarking as "the search for best industry practices that will lead to superior performance" (Davies and Kochhar, 1999). It is "the continuous process of measuring products, services and practices against a company‟s toughest competitors or those companies renowned as industry leaders". It incorporates learning, exchanging and adapting best practices to an organization and is described as the "preferred method for improving performance" (Camp, 1989) which requires constantly emulating the best and aspiring for superior performance standards (Zairi, 1994). Camp (1989) is seminal and is referred to by most leading authors on the subject and offers a generally accepted understanding of what benchmarking entails.

According to Hinton et al. (2000), benchmarking is *"the pursuit by organisations of enhanced performance by learning from the successful practices of others"*. It is a systematic approach to business improvement where best practice is sought and implemented to improve the component practices of a process beyond the benchmark practices observed in best-in-class organisations. This helps to improve processes beyond the benchmark performance (Partnership Sourcing, 1997). Benchmarking provides a reference point used as a standard of comparison for actual performance with benchmark organisations – considered to be the "best in any industry" (Gryna, 2001). In benchmarking, the best-in-class organisations are identified and used as the standard to aspire to.

3.6.2 Why benchmarking is important

Benchmarking helps organisations to deliver better services through continuous improvement (Lam et al., 2004). It is a catalyst for improvement and innovation, achieved by learning from best practices and understanding the processes by which they have been achieved by the bestin-class (Anand and Kodali, 2008). Benchmarking helps to increase efficiency, create customer awareness, improve profitability and make continuous improvements (Cooke, 1997). It offers opportunities for improving performance (Cooke, 1997) achieving worldclass performance (Munroe-Faure & Munroe-Faure, 1992). McDonald et al. (2002) suggested that to achieve world-class status, organisations have to closely examine their operations, processes and their customers and compare themselves with the best-in-class. From these, it can be seen that benchmarking helps to facilitate improvements in performance and worldclass performance can thus be made possible through comparisons with world-class organisations and learning from their experience.

3.6.3 Benchmarking Benefits

For organisations which seek to attain world-class performance, benchmarking helps to identify what is possible and how to achieve exceptional performance (Davies and Kochhar, 1999). It motivates organisations to constantly work on identifying gaps in performance and developing the right strategies for closing these gaps. Whilst benchmarking in itself does not improve performance, it helps organisations to optimize their capabilities to deliver by developing internal processes to be superior, consistent and very effective. This helps to optimize delivery to the end customer and ensure total satisfaction (Zairi, 1994).

3.6.4 Types of benchmarking

World-class benchmarking is the final level in benchmarking and involves "looking toward the recognised industry leader – an organisation that does it better than any other" (Chang & Kelly, 1995). Camp (1989) describes world-class benchmarking as generic (or process benchmarking) which involves the benchmarking of generic processes against best practice or against the leaders in any industry. Benchmarking does not take place only when like data is compared. It can involve adventurous comparisons amongst organisations from different sectors (Hinton et al., 2000). This gives an opportunity to see how others operate their activities which also fits into what Camp (1995) describes as "generic" and "functional" benchmarking.

3.6.5 Gaps in benchmarking Literature

Some of the areas of inadequacies which "have not been sufficiently addressed or addressed at all" in literature and past benchmarking studies are: the cost aspects of benchmarking, duration of benchmarking exercise, human resources in benchmarking activities and selection of benchmarking partner (Dattakumar and Jagadeesh, 2003).

Literature relating to the costs and benefits of benchmarking is generally scant (Dorsch and Yasin, 1998). According to Dattakumar and Jagadeesh (2003), the overall cost incurred in benchmarking needs to be established in terms of models or costs equations to enable decision makers to establish the full financial commitments before benchmarking starts. This will also help estimate the potential return on investment before commencing benchmarking. The lack of information on the cost-effectiveness of benchmarking in practice affects the decision-making process as managers are not able to make informed decisions about whether or not to implement benchmarking programmes and whether such programmes result in bottom-line improvements. This problem can be addressed through empirical research designed to assess the costs and benefits of benchmarking (Dorsch and Yasin, 1998).

A method to establish the time requirements of benchmarking exercises will help in setting targets and deadlines. Also, instances where benchmarking partners are unwilling to share business practices are a major deterrent to the benchmarking process. This can be addressed by explaining clearly the processes involved in selecting a benchmarking partner as well as the duties and responsibilities of the partner (Dattakumar and Jagadeesh, 2003).

The „lack of relevant conceptual (benchmarking) models" has been cites as a reason for the reluctance of the construction industry to adopt benchmarking (Mohammed, 1996). Most existing benchmarking models are generic and do not reflect the peculiarities of the construction industry. It is generally not easy to adapt models developed and customized for particular sectors for other industry sectors (Anand and Kodali, 2008). Whilst the construction industry can learn from the experiences of the manufacturing sector, the respective characteristics of the manufacturing and construction industry environments, incomplete or non-existent data in the construction industry (Mohammed, 1996), coupled with the peculiar nature of the construction industry and its one-of-a kind projects (The Construction Task Force, 1998), establishes the case for a new study relating to benchmarking, and in particular, for the construction industry.

3.6.6 Identifying what to benchmark

The first step to identifying what to benchmark is to identify the product or the output of the business involved. This can be achieved by first developing a clear mission statement, following which the entity"s broad purpose should be broken down into specific outputs to be benchmarked. Outputs should be documented to the levels of detail which makes it possible to undertake analyses of costs and key tasks (Camp, 1989).

Benchmarking may be divided into two parts: practices and metrics. The benchmarking activity should start with an investigation of the best industry practices (*critical success factors)*, followed by the analysis of the effects of incorporating these best practices in an operation, also known as *performance measures (Camp, 1989)*. The Camp (1989) approach addresses the question of whether the focus of benchmarking efforts should be on enablers or results. With the ultimate focus on the end customer, benchmarking efforts should target "activities" (processes) not "results" as a means to attaining tangible results such as increased sales and profits (Zairi 1994).

Pricewaterhouse Coopers (PwC) uses a list of performance areas to select what to benchmark as follows: accounts payable, accounts receivable, records of contact centre involvement, finance and accounting, finance and effectiveness, global state of information security, human resources and Information Technology. Other performance areas which are used by PwC for benchmarking programmes are: insurance consolidation and reporting, internal audit, internal controls and optimisation, inventory management and payroll. The rest are: purchasing, service provider performance, supply chain, tax and treasury (PwC, 2009). This list shows the relevant areas of comparison used and promoted by PwC for benchmarking efforts from which organisations may choose what to benchmark. Best-in-class organisations will generally demonstrate excellence in most of these areas.

3.6.7 Benchmarking Effectiveness

For benchmarking to be effective, the scope must be expanded to cover other contributing levels within a business to ensure that performance measures and associated targets for strategic objectives are devolved throughout the organisation and focused on areas that can satisfy them whilst best practices are identified and applied to improve the performance of these areas (Davies and Kochhar, 1999). Effective benchmarking programmes measure true competitive performance and give organizations a clear advantage through on-going strategic exploitation (Zairi, 1994).

Effective benchmarking requires the implementing company to know its operations and assessing their weaknesses and strengths, knowing the industry leaders and competitors; and incorporating the best practices used by the best into their operations as a means to getting superiority (Camp, 1989). These confirm the asserting that benchmarking is not an end in itself but its effectiveness rests with a commitment to apply the lessons learnt from the best.

The Camp (1989) fundamentals above can be integrated into the ten (10) pre-requisites for effective benchmarking (Davies and Kochhar, 1999) as follows:

1. Benchmarking should be linked to competitive priorities by ensuring that the objectives support overall business objectives;
2. Benchmarking should be linked at a strategic level to other improvement programmes such as TQM and business process engineering, all focusing on the same issues;
3. Link benchmarking to performance measurement;
4. Recommendations should be phased into action plans taking into account available resources;
5. Targets and objectives should be realistic;
6. The potential benefits should be communicated continually to maintain enthusiasm and momentum.

7. Strong direction and support of management should be encouraged in order to ensure management support for any investments required during implementation;

8. There should be a clearly communicated definition of what benchmarking is as well as guidelines relating to the time duration for the project and its planning, analysis techniques and methods of integration into current plans;

9. Offer educational and training programmes on benchmarking for employees; and

10. Benchmark lower levels of the organisation.

These "prerequisites of benchmarking can enhance the benchmarking implementation process but do not describe how to undertake effective benchmarking. Camp (1989) addresses the "how to" question with a 10-step process - consisting of five essential phases - for conducting benchmarking investigations. The phases together with the corresponding actions required during each phase are shown in table 3.1.

Table 3.1 Camp (1989)'s Benchmarking Stages

Step	Action Required	**Phase**
1	Identify what is to be benchmarked	Planning
2	Identify comparative companies	Planning
3	Determine the data collection method	Planning
4	Determine current performance levels / performance gap	Analysis

5	Project future performance levels	Analysis
6	Communicate benchmark findings to all employees and gain acceptance	Integration
7	Establish functional goals / revise performance goals	Integration
8	Develop action plans	Action
9	Implement specific actions and monitor progress	Action
10	Recalibrate benchmarks	Action
Result:	Leadership position attained	Maturity
Result:	Practices fully integrated into process	Maturity

3.6.8 Benchmarking frameworks

Deros et al. (2006) defined a *Benchmarking Framework* as a set of simplified theoretical principles and practical guidelines used to carry out benchmarking implementation and adoption, which can enhance the chances of success. According to Deros et al. (2006), a benchmarking framework should be easy to understand, efficient and it should be possible to implement within a reasonable cost and time. Dorsch and Yasin (1998) developed a benchmarking framework for public sector organisations (fig.3.2) from the review of 121 publications spanning the period between 1986 when the earliest benchmarking articles appeared and 1995 (Table 3.2).

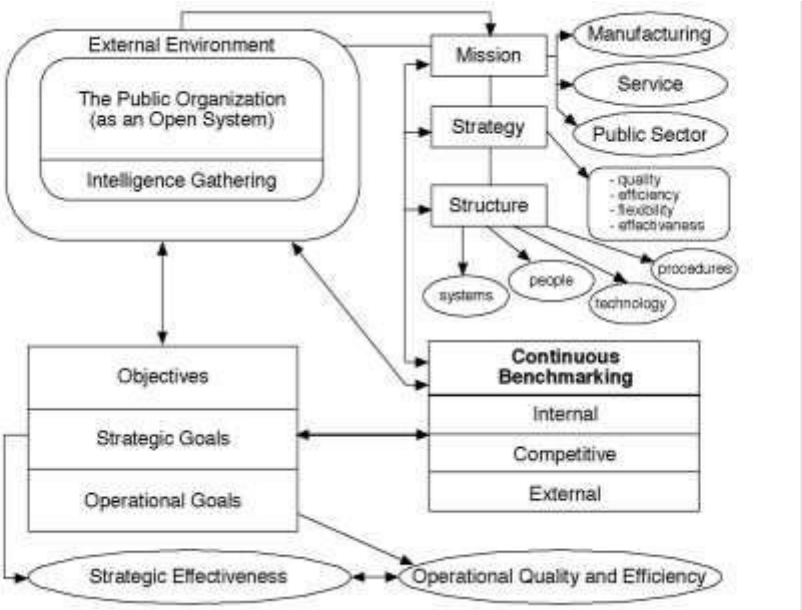


Fig 3.2 Dorsch and Yasin (1998)'s benchmarking framework for public sector organisations

Table 3.2 Benchmarking publications breakdown

Type	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Total
Practitioner articles	1[a] (100) [0.3]	3 (100) [0.9]	2 (100) [0.6]	11 (92) [3]	13 (100) [4]	17 (100) [5]	55 (89) [16]	99 (87) [28]	78 (82) [22]	70 (73) [20]	349
Academic articles	0 (0) [0]	0 (0) [0]	0 (0) [0]	0 (0) [0]	0 (0) [0]	0 (0) [0]	2 (3) [8]	4 (4) [17]	6 (6) [25]	12 (13) [50]	24
Books	0 (0) [0]	0 (0) [0]	0 (0) [0]	1 (8) [2]	0 (0) [0]	0 (0) [0]	5 (8) [12]	11 (10) [26]	11 (12) [26]	14 (15) [33]	42
Total	1	3	2	12	13	17	62	114	95	96	415

Notes: [a] = Number of publications
( ) = percentage per year
[ ] = percentage per year

Source: Dorsch and Yasin (1998)

The publications comprised of practitioner articles, academic articles and books. It can be seen from Dorsch and Yasin (1998) that academic articles on benchmarking started appearing around 1992 and that as of 1995, the majority of articles on the subject were by practioneers.

Fong et al. (2001) developed a framework for benchmarking the Value Management process. Based on a review of literature, the critical success factors and related performance metrics were identified which could be "applied to different work processes across different. From the review of literature, Fong et al. (2001) identified eight common stages common to benchmarking:

i. Deciding what to benchmark ii. Understanding your own performance, including the identification of the CSFs and key performance metrics iii. Identifying the best performers for comparisons including direct competitors, best-in-class organisations and or internal functional areas.

iv. Collect and analyse data

v. Determine current performance levels and project future performance levels.

vi. Gain acceptance and establish functional goals vii. Develop action plans and implement the best practices. viii. Monitor progress and re-calibrate the benchmark measures.

The Fong et al. (2001) benchmarking framework comprises the five phases of the VM process: orientation phase, information and analysis phase, speculation phase, evaluation phase and the implementation phase. For each of the five Value Management phases, the key characteristics are identified as well as their associated CSFs and performance measures. For all the phases, a single CSF is provided apart from the speculation phase where three CSFs are provided. Measures of performance in each of the associated performance metrics is made possible through the use of a Likert Scale or as a percentage.

3.6.9 Shortcomings of benchmarking and existing benchmarking frameworks

Some of the problems identified as affecting the uptake of benchmarking are the identification of suitable partners, identification of comparable data and resource constraints such as time, finance and expertise. Amongst the constraints time is described as the greatest constraint (Hinton et al., 2000). The general feeling in most organisations is that benchmarking is quite time-consuming for staff and quite expensive (Hinton et al, 2000), also confirmed by Holloway et al. (1997). There is also evidence that the costs of benchmarking can outweigh the benefits (Lincoln & Price, 1996). Further, it has been argued that most of the existing frameworks are based on large company structures and are thus unsuitable for small and medium scale organisations (Deros et al., 2006). Generally, large organisations and those which are subsidiaries of large organisations are most likely to be involved in benchmarking (Holloway et al, 1997).

Hinton et al. (2000) explored the focus of benchmarking programmes and concluded that substantial benchmarking activity was "results" benchmarking as opposed to "process" benchmarking. It is explained that developing process measures is more difficult yet they are more effective in addressing the comparability issue and more valuable in improving performance (Hinton et al., 2000). In developing a framework for the Ghanaian industry, consideration has been given to both processes and results benchmarking.

One of the more popular frameworks reviewed is the Fong et al. (2001) benchmarking framework. The value of the Fong et al. (2001) framework is limited in a number of ways.

Firstly, the number of CSFs provided is not sufficient to enable organisations new to benchmarking or with little experience of benchmarking to effectively apply the framework for maximum effect. Again why it provides clear options for assessing performance, it does not provide sufficient opportunities for comparisons to be made with the best-in-class in selected metrics.

Deros et al. (2006) studied more than twenty (20) benchmarking frameworks and concluded amongst other things that most of the frameworks were too complicated and only provided the "steps to be taken" for benchmarking in a specific functional area such as manufacturing, innovation and technology management, product development and customer satisfaction, rather than being a general outline for benchmarking implementation on a wholesale basis. It can also be deduced from Deros et al. (2006)‟s review of the existing frameworks that none of them gives specific examples of areas which organisations can compare their performance with those of the best-in-class organisations. Gbobadian and Woo (1996) assessed the weaknesses of the Deming Prize, the Baldridge Award and the EFQM Excellence model The models are criticised for their weakened focus on business results arguing that the awards are too process-oriented. The high cost of implementing these models and the process of applying for the awards is criticised, citing Xerox‟s $800,000 spent to win the Baldridge Award. The effort and investment required to participate in the award process is questioned challenging the ability of small businesses and non-multinationals to engage with benchmarking programmes (Gbobadian and Woo, 1996).

Davies and Kochhar (1999) studied the extent of application and the problems associated with benchmarking. The study which focused on the UK found amongst other things that there was limited use of benchmarking which was focused mainly on company visits and metrics. The study also showed that operational targets were not based on metrics and that there was a lack of implementation of best practice. Other findings were that results were not fed back into business plan targets, that there was a pre-occupation with metrics rather than the practices behind superior performance whilst benchmarking was mistaken to be competitive analysis.

Again findings were not implemented with a lack of planning resulting in poor results. In some cases, Studies were too large and superficial and benchmarking projects lacked structure with some organisations believing they were unique and thus not possible to benchmark with any organisation.

The Davies and Kochhar (1999) review identified the main challenges which affect the implementation of benchmarking programmes. These challenges are taken into account in the development of the benchmarking framework for the Ghanaian construction industry.

3.7 CRITICAL SUCCESS FACTORS (CSFS) FOR PERFORMANCE EXCELLENCE

Management entities are generally inundated with lots of data hence the need for selectivity as an essential tool to guide the management process. Critical success factors (CFSs) are performance variables which help to filter out extraneous data coming through to management (Bond, 1999). CSFs are enablers which when put into practice will enhance the prospects for successful benchmarking implementation (Deros et al., 2006). They are very useful for managers and decision makers (Kasul and Motwani, 1994), with the attainment of excellence in CSFs linked to performance excellence.

3.7.1 Critical success factors (CSFs) from existing performance improvement models

There are many frameworks and models for improving business performance. Some of the most popular models and frameworks used for improving performance are now reviewed to identify the critical factors which can lead to business excellence.

Deros et al. (2006) reviewed major benchmarking frameworks including the frameworks by

Lee (2002), Fong et al. (2001), Davies and Kochhar (2002), Medori and Steeple (2000) and Crow (1999). Other benchmarking frameworks reviewed in Deros et al. (2006) include the Malaysian Benchmarking Service, NPC (1999) Framework, the Voss et al. (1994) Framework, the Zairi (1994) and Spendolini (1992) frameworks. The Deros et al. (2006) review leads to the development of a benchmarking framework for the automotive small and medium-scale enterprise (SME) sector which identifies the following CSFs: top management leadership, resources management, business results, systems and processes, creativity and innovation, human resource management, policy and strategic planning. The rest of the CSFs identified by Deros et al. (2006) are customer satisfaction, employee satisfaction, organisational culture and work environment. Deros et al. (2006) concedes that this list of CSFs is not exhaustive and recommends that additional CSFs should be added to the list whenever appropriate. This study explores potential new CSFs in the context of the construction industry. A suite of CSFs is proposed from which contractors may select appropriate CSFs relevant to their projects and operations. In the next section, the success criteria used in existing programmes and models for improving performance are reviewed.

3.7.1.1 The European Foundation for Quality Management (EFQM) Excellence Model

Introduced in 1992, the EFQM Excellence Model (fig.3.3) is a non-prescriptive and flexible framework used for assessing organisations for the European Quality Award. It is also widely used in Europe as the organisational framework and the basis for many national and regional Quality Awards. As a diagnostic tool, the EFQM can help user organisations to put in place an improvement plan to improve their results (Quality Scotland2008). The EFQM is based on nine (9) criteria sub-divided into ENABLERS and RESULTS criteria respectively. The ENABLERS are what an organisation does and the RESULTS are what it achieves. Of the nine

(9) criteria, the first five (5) – *leadership, people, policy, partnerships & resources and processes* – are the „enablers" whilst *people results, customer results, society results* and *key performance results* are described as the „results" criteria (Quality Scotland 2008).

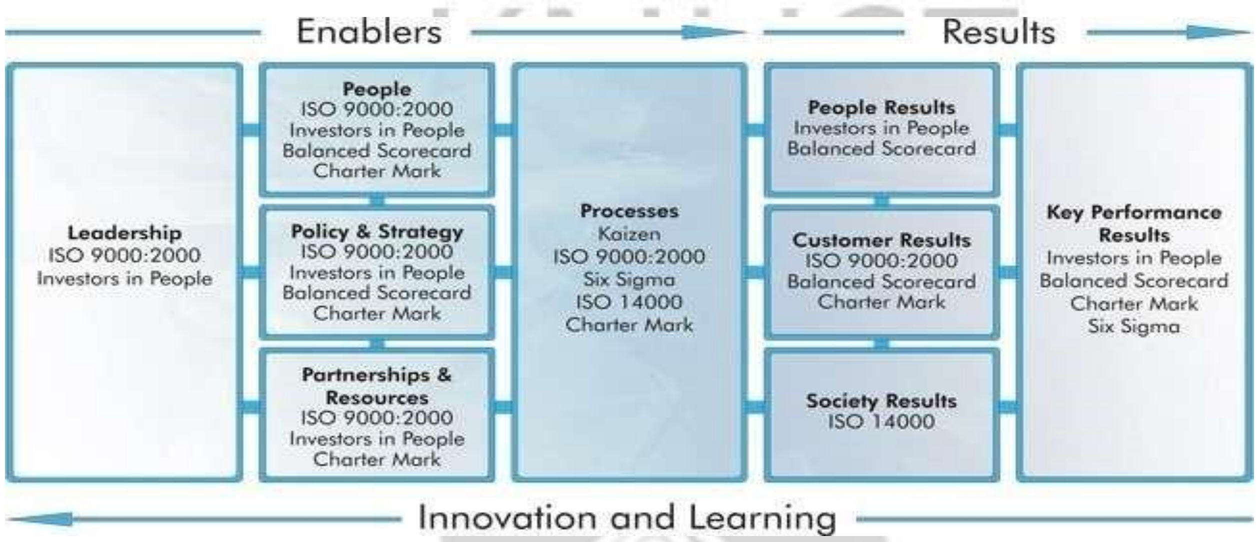


Figure 3.3 EFQM Excellence model **(Source: Quality Scotland, 2008)**

Bassioni (2008) developed a model for construction excellence which like the Excellence Model divides the criteria into two – the Enablers and the Results criteria as shown below in Table 3.3.In addition to the EFQM Excellence Model criteria, Bassioni (2008) introduces additional criteria such as work culture, strategic management, suppliers, risk, customer and stakeholder focus which also play a critical role in business success as shown in Deros et al. (2006), NIST (2008) and Petersen (1999).

Table 3.3 Enabler and Results for the Bassioni (2008) Model

Enablers	**Result Criteria**

Leadership, Suppliers, Customer & Stakeholder focus, Physical Resources, Strategic Management, Intellectual Capital, Information and Analysis, Risk, People, Work Culture, Partnership, Process Management, Leadership	Internal Stakeholders, Project & External Stakeholders, and Organisational Business Results

3.7.1.2 The Xerox Model

Xerox learnt extensively from the work of W.E.Deming, P.Crosby, the Japanese Quality Award framework (the Deming Prize) and the Malcolm Baldridge National Quality Award. Through benchmarking and other self-assessment programmes, Xerox became was recognised for its leadership through quality programme (Dahlgaard-Park and Dahlgaard, 2007). Xerox, the foremost organisation to implement a benchmarking programme (Camp, 1989), defined excellence as being certified with high scores in six (6) excellence criteria: management leadership, human resource management, business process management, customer and market focus, information utilization, quality tools and business results (Dahlgaard-Park and Dahlgaard, 2007). Like the EFQM and the Bassioni (2008) Models, the first five criteria in the Xerox model are referred to as the enablers. These constitute the critical success factors which largely account for the sixth criterion – business results.

3.7.1.3 The Malcolm Baldridge National Quality Award (MBNQA)

The Malcolm Baldridge National Quality Award is the national programme for recognizing and promoting excellence in business in the United States of America (USA). It provides criteria which enable organisations to measure their performance and to target improvements in their performance. The Baldridge Award criteria are as follows: leadership, strategic planning, customer and market focus, measurement, analysis & knowledge management, workforce focus, process management and results (NIST, 2008).

3.7.1.4 The Deming Prize

The Sub-committee of the Implementation Award for the Deming Prize (1992) identified 10 criteria which are assessed for the award of the Deming Prize. These are: policy, organisational management, education and dissemination, collection, dissemination and use of information on quality, analysis and standardization. The rest are: control, quality assurance, results and planning for the future.

3.7.1.5 High Performance Organisations (HPOs)

De Waal (2007) explores the concept of High Performance Organisations (HPOs) and defines a high performance organization as an organization that achieves better financial results than its peers over a long period by adapting well to changes, reacting quickly and managing for the long term. High performance is achieved by continuously improving its core capabilities and treating employees as the main asset. There are eight factors (fig.3.4) which influence employee behaviour leading to high performance in organisations: external environment, organisational design, strategy and process management. The rest are technology, leadership, individual roles and organisational culture (de Waal 2007).

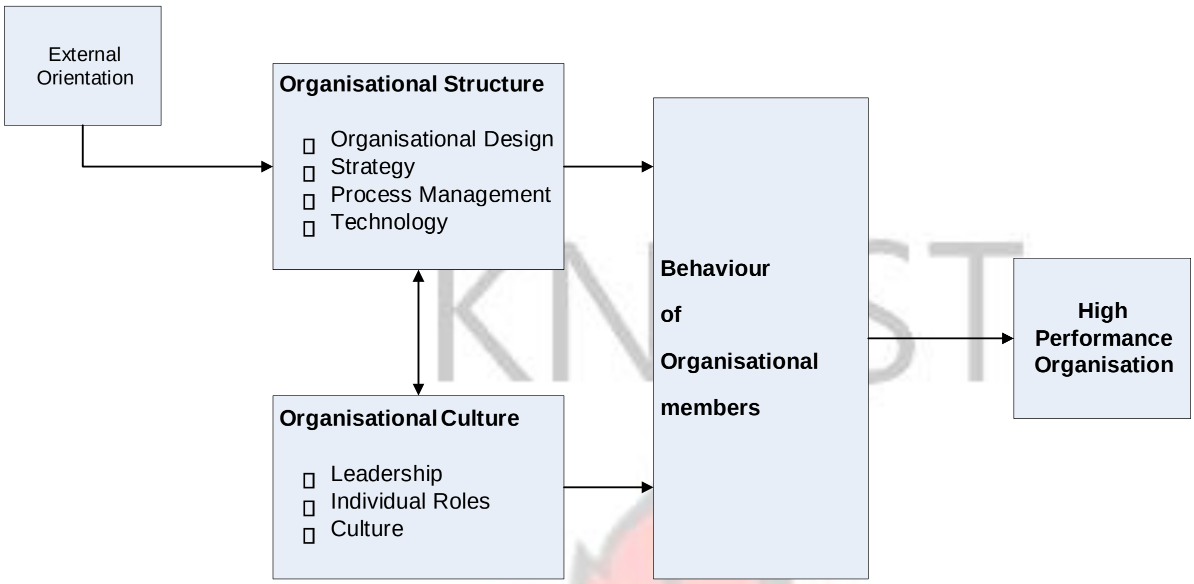


Figure 3.4 Framework of high performance organisations (de Waal, 2007)

3.7.1.6 Six Sigma

According to Pande et al. (2003), Six Sigma is a comprehensive system for achieving, sustaining and maximizing business success. Pande et al. (2003) established the *Six Sigma Roadmap* for launching improvements in organisations. The five steps which make up the roadmap feature the "core competencies" for a 21st century organisation. Pande et al. (2003)"s core competences for 21st century organisations are: identify core processes and key customers, define customer requirements, measure current performance, prioritise, analyse and implement improvements, expand and integrate the Six Sigma system. Some of the benefits attributed by Pande et al. (2003) to the implementation of Six Sigma are: cost reduction, productivity improvement, market share growth, customer retention, cycle time reduction, defection reduction, and culture change and product / service development.

3.7.1.7 CSFs from existing literature

The Construction Task Force (1998) identified five (5) drivers of change which drove the manufacturing and service industries to achieve radical changes. These drivers of change are:

1. Committed leadership;
2. A focus on the customer;
3. Integrating the process and the team around the product;
4. A quality driven agenda; and
5. Commitment to people;

These drivers of change provide a model for dramatic improvements and business success in the 21st century. It is recommended that the construction industry should learn from the experience of the automobile industry if such levels of improvements will be achieved (The Construction Task Force, 1998).

Toyota is the most successful car manufacturer in the world (Dahlgaard-Park and Dahlgaard, 2007) – one of the largest industrial companies in the world and has been acknowledged in Industry Week‟s 100 Best Managed Companies in the world (Fang and Kleiner, 2003). Fang and Kleiner (2003) explored the processes which accounted for excellence at Toyota Motor Manufacturing in the United States and which could be applied to other organisations for improvement. The processes identified are: the implementation of Japanese values and philosophy, The Toyota Production System, the hiring process, teams, open communications, corporate structure, non-monetary awards and pay/bonus system. These factors collectively contribute to Toyota‟s success and leadership.

As in Fang and Kleiner (2003), Liker (2004) explores the *Toyota Way*. Fourteen (14) management principles behind Toyota‟s success are identified as follows: long term philosophy, pull systems, level-out workload, process flow, cease operating when there is a quality problem, respect, standardize, visual controls, technology reliability, develop leaders who live the philosophy, develop and challenge your people and teams and respect. The rest of Liker (2004)‟s management principles are: support for suppliers, continuous organisational learning though Kaizen, thorough understanding though verification; and consensus decision making which means consider all options but implement rapidly. These represent the foundations on which the success of Toyota over the years has been built. Dahlgaard-Park and Dahlgaard (2007) integrated the 14 principles which make up the *Toyota Way* into the *4 Ps Model* of the Toyota Production System: problem solving, people and partners, process and philosophy. The *4 Ps Model* of the Toyota Production System has some similarities with Peters and Austin (1985)‟s four critical success factors: people, care of customers, constant innovation and leadership which hold together the first three factors using management by walk-about (MBWA) philosophy at all levels of the organisation.

Koskela (1992) identified eleven (11) heuristic principles for the New Production Philosophy. The philosophy which applies Lean principles to eliminate waste and deliver increased value to customers has the following principles according to Koskela (1992): Reduce the share of non-value-adding activities, increase output value through systematic consideration of customer requirements, reduce variability and reduce cycle time. Others are: simplify by minimizing the number of steps, parts and linkages, increase output flexibility, increase process transparency and focus control on the complete process. The rest are; build continuous improvement into the process, balance flow improvement with conversion improvement and benchmark. Koskela (1992)‟s New Production Philosophy provides a means of improving the performance of organisations than other established approaches to improving performance such as Total Quality Management (TQM).

Munro-Faure & Munro Faure (1992) opined that continued success may be obtained by organisations using TQM. TQM is defined by Munro-Faure & Munro Faure (1992) as meeting customer requirements at minimum cost. Five (5) components of TQM are identified as: understanding customers, understanding the business, quality management systems, continuous quality improvement and quality tools. Each of the five components described in the Munro-Faure & Munro Faure (1992) model has their respective sub-criteria as shown in table 3.4.

Harris and McCaffer (2001) identified 12 steps for improving quality as follows: implementation, training, teamwork and control. Others are capability, systems, design and planning. The rest are measurements, organisation, commitment & policy and understanding.

Petersen (1999) alludes to fourteen (14) steps of quality improvement. These are: management commitment, quality improvement team, measurement, cost of quality, quality awareness, corrective action, zero defects (ZD) planning, employee education, ZD day, goal setting, error-cause removal, recognition, quality councils, and do it over again.

Christopher and Thor (2001) suggested fifteen (15) strategies for achieving world-class quality as follows: vision, outcomes, customer value, goals, measures, empowerment, teamwork, continuous improvement, innovation, excellence, learning & knowledge, systems, recognition & celebration, sharing, and Change. The Christopher and Thor (2001) strategies and sub-criteria for enabling world-class performance are shown in table 3.5.

Table 3.4 Components of Total Quality Management

Understanding Customers	Understanding the Business	Continuous Quality Improvement	Quality Management Systems	Quality Tools

External	Functional Analysis	Management Commitment	BS 5750	Statistical Process Control
		Employee Involvement	ISO9000	Quality Function Deployment
Internal	Quality costs	Education	AQAP	Benchmarking
		Teamwork		Problem solving
		Measurement		
		Error prevention		

Source: Munro-Faure and Munro-Faure (1992)

Table 3.5 Strategies for achieving world-class quality

STRATEGY	**SUB-CRITERIA**
Vision	
Outcomes	
Customer value	1. The Manufacturing Enterprise Wheel 2. Re-engineering to a customer focus 3. Internal customers
Goals	1. Vision, outcome, goals 2. Setting goals 3. Goals and measures
Measures	1. Examples of families of measures 2. Using an objectives matrix
Empowerment	
Teamwork	1. Temporary teams 2. Permanent teams 3. Self-managed teams

Continuous improvement	1. Continuously improved processes 2. Elimination of waste
Innovation	
Excellence	1. Benchmarking 2. Strategic benchmarking 3. Business process benchmarking 4. Goal setting
Learning and Knowledge	
Systems	1. Systems thinking and systems models 2. A model focusing on customers
Recognition and celebration	1. Learning 2. Education and training 3. Knowledge
Sharing	
Change	

Christopher and Thor (2001)

3.7.1.8 Critical Success Factors (CSFs) for World-class manufacturing (WCM)

The term "World-class Manufacturing" was first used by Richard J. Schonberger in *World Class Manufacturing: The Lessons of Simplicity Applied* (www.wcm-wcp.com; *accessed 30th June, 2012).* Schonberger (1996) proposes 16 principles for WCM as follows: teaming up with customers; organizing by customer or product family, capturing and using competitive customer and best-practice information, initiating continual improvement for customers and involving the workforce in change and strategic planning. Others are suggestions to cut down components operations, suppliers to a few, cutting total cycle time and distance and changeover times, operating close to customers‟ rate of use or demand, training everybody continually for their new roles, expanding variety of rewards, recognition and pay, continually reducing variation and mishaps, recording process data at workplace by frontline teams and controlling the root causes to cut internal transactions and reporting. The rest are aligning performance metrics with universal customer wants, improving current capacity before new equipment and automation, seeking simple, movable, scalable, low-cost, focused equipment and promoting, marketing and selling every improvement achieved. These principles are seen as both characteristic of very successful organisations and predictors of future success.

Kasul and Motwani (1994) reviewed literature on World-class manufacturing extensively. Amongst the works reviewed in Kasul and Motwani (1994) are Schonberger (1986), Heifer (1986), Beck (1989), Green (1989), Markell (1989), Schlotterbeck (1989), Stickler (1989), Cahn (1990), Sheridan (1990), Cook (1991), Miller (1991), Polakoff (1991) and Ross (1991). Kasul and Motwani (1994) modified the Schonberger (1986) principles into 18 factors as follows:

1. Getting to know the customer;
2. Decreasing work in process;
3. Cutting flow time;
4. Reducing set-up and changeover time;
5. Shortening flow distance and space;
6. Increasing the make / deliver frequency for each required item;
7. Reducing the number of suppliers to a few good ones and cutting the number of parts;
8. Make it easy to manufacture product without error;
9. Arranging the factory layout to reduce search time;
10. Cross-training for mastery of more than one job;
11. Recording and retaining production;
12. Quality and problem data at the workplace
13. Make line people attempt problems before staff experts;
14. Maintain / improve existing workforce and machines before thinking about new equipment;
15. Use simple, movable and cheap equipment;

16. Have plural rather than singular workstations;
17. Machines and lines for each producer; and
18. Automate incrementally when product variability cannot otherwise be reduced.

Kasul and Motwani (1994) categorises the eighteen (18) principles into four groups: quality, cost, time and customer service. Using a combination of brainstorming with manufacturing professionals, content validity analysis of literature, Kasul and Motwani (1994) developed a final set of eight (8) composite factors described as the most "important aspects of WCM practice. These are: quality, lead time, customer service, management commitment, valueadded emphasis, material policy, facility control and equipment / technology.

Practices are characteristics which describe internal and external business behaviours and tend to lead to the creation of a performance gap (Zairi, 1994). According to Zairi (1994), practices may be related to: processes, organisational structures, management systems, human factors and strategic approaches.

Hodgetts et al. (1994) described a new paradigm for successful organisations with strong linkages between Total Quality, Learning and world-class organisations. World-class organisations are described as incorporating both total quality and learning organisation characteristics and able to excel in most of the important dimensions of both total quality and learning organisations. Hodgetts et al. (1994) argued that there are no universal criteria for total quality organisations but identified 10 characteristics which are common to most total quality enterprises as follows: customer driven, leadership commitment, full participation of all employees, reward system, reduced cycle time and error prevention. The rest are: management by facts, long-range outlook, partnership development and public responsibility (Hodgetts et al., 1994). Six (6) characteristics of Learning Organisations are as follows: a desire to learn, knowledge transfer, technology, external environment, shared vision and systems thinking. The characteristics of world-class organisations show most of the features of total quality and learning organisations respectively. Hodgetts et al. (1994) concluded with six (6) pillars of world-class organisations: customer-based focus, continuous improvement, fluid & flexible or virtual organisations, creative human resource management, egalitarian climate and technological support.

Kasul and Motwani (1995) is a further development to Kasul and Motwani (1994). Whilst the main core of the findings of the earlier study is retained, Kasul and Motwani (1995) identified new factors which account for manufacturing success consisting of nine (9) critical success factors (CSFs) / best practices for world-class operations: management commitment, quality, customer service, vendor and material management, advanced technology and facility control. The rest are flexibility, price / cost leadership and global competitiveness. The introduction of flexibility, price & cost leadership and global competitiveness" at the expense of lead-time and value-added emphasis does not de-emphasise the significance of the latter. It can be argued that lead-time and value-added are covered through advanced technology and price & cost leadership. The Kasul and Motwani (1994) and Kasul and Motwani (1995) practices are considered in the manufacturing context but they can be equally adapted and applied to other industries like the construction industry.

Dahlgaard-Park and Dahlgaard (2007) reviews well known excellence frameworks and models spanning a 25-year period. In Dahlgaard-Park and Dahlgaard (2007), McKinsey"s 7-S framework is described as "success criteria for excellence" with the respective factors categorised into *hardware* and *software* factors. The *Hardware* factors are: Structure and Strategy whilst the *Software* factors are: Systems, Shared Values, Skills, Staff and Style.

Gilgeous and Gilgeous (1999) developed a practical framework to support the implementation of manufacturing excellence across all industries. Seven companies nominated for the Confederation of British Industries (CBI) and the Department of Trade and

Industries (DTI) in the UK"s best factory award were studied as part of a pilot study. Gilgeous and Gilgeous (1999) found twelve (12) key factors, which were common to all the companies studied. These are: human factors, survival bid, re-organisation of existing sites, customer focus, quality standard, investment in new technology and a focus on core competencies. The rest are Benchmarking, the integration of design and manufacture, increased communication, strategic planning and collaboration with other companies. Gilgeous and Gilgeous (1999) further re-coded the 12 key factors into 8 factors common to all seven companies studied. These are: innovation and change, empowerment, Learning organisation characteristics, customer focus and commitment, commitment to quality, firstrate management team / belief in organisation, technology and information systems and the establishment of win-win relationships with suppliers. The 8 factors were incorporated into the Manufacturing Excellence Framework (Gilgeous and Gilgeous 2001). The most important of the 8 factors, in rank order, according to Gilgeous and Gilgeous (2001) are: customer focus and commitment, commitment to quality, first rate management team / belief in the organisation and empowerment.

Flynn et al. (1999) reviewed the seminal work by Hayes and Wheelwright who first used the term “world-class manufacturing” in 1984. Flynn at al. (1999) alludes to the description by Hayes and Wheelwright (1984) of world-class manufacturing as a set of practices. This suggests the availability of a set of practices, the use of which could lead to superior performance. Flynn et al. (1999) outlines six (6) practices of world-class manufacturing as follows: workforce skills and capabilities, management technical competence, competing through quality, workforce participation, rebuilding manufacturing engineering and incremental improvement approaches. The Flynn et al. (1999) study generally supports the seminal work by Schonberger (1986) on the characteristics of world-class manufacturing.

3.7.1.9 CSFs Summary

In this section, the most common factors described by different authors and in the literature reviewed as being responsible for business excellence have been identified. The wide variety of factors identified in this review shows the difficulty with efforts to develop a prescriptive set of factors responsible for business and organisational excellence. It can however be argued that those factors cited most often in literature and used in most existing models and frameworks for improving performance may give an indication of the relative importance of the respective factors. Through a scoring and ranking exercise, the most important factors were identified (see appendix 1). The factors identified in this section are universal and can be adapted to the peculiar needs of the construction industry as required. In later sections of this thesis, the most popular of the identified factors are explored.

The CSFs developed in this section describe the core competencies required of Ghanaian contractors and show the areas of relative importance where Ghanaian contractors have to excel of they are to improve their performance. It is important that Ghanaian contractors assess their competitiveness by comparing their performance with best-in-class in these CSFs and overall best-in-class organisations whilst learning and emulating from these organisations.

3.8 KEY PERFORMANCE INDICATORS (KPIS)

A Key Performance Indicator (KPI) is a measure of performance of an activity which is critical to the success of an organisation (Constructing Excellence, 2009). The purpose of KPIs is to enable measurement of project and organisational performance throughout the construction industry (The KPI Working Group, 2000). KPIs have been used to introduce many construction companies to performance measurement. They are most effective when used as part of a measuring system (Beatham et al., 2004).

3.8.1 Selecting Performance Measures

According to Beatham et al. (2004), the subject of performance is vast with numerous authors continuously adding to the body of literature on the subject, citing that between 1994 and 1996 for instance, one paper or article on "performance" appeared every five hours of every working day. Robson (2004) suggests that the sheer numbers of organisational performance measures creates "paralysis by analysis". Thus any effort to bring the extensive existing knowledge, past research and literature together will help simplify the process for selecting performance measures and will help managers to better select what measures to measure. Too many or too few or inappropriate performance measures can easily create a deterioration in overall performance. An effective approach to selecting performance measures is to identify the minimum set of measures which can establish whether the overall performance of a process was acceptable or otherwise (Robson, 2004).

In the selection of performance measures, Bond (1999) suggests that performance measures reinforce the activities that are in the best interest of the company. According to Robson (2004), before trying to identify all the possible factors that can be measured, organisations should align the reasons for implementing a performance measurement system with the need to improve overall effectiveness of the business process.

Developing a performance measurement system generally involves identifying a balanced set of measures, measuring what matters to service users and other stakeholders, involving staff in the determination of the measures, including both perception measures and performance indicators (Moullin, 2004). A combination of process and outcome measures should be used taking account of the cost of measuring performance, having clear systems for translating feedback from measures into a strategy for action and focusing measurement systems on continuous improvement.

3.8.2 Examples of Performance Measures from literature

Sousa et al. (2006) identified nine (9) main performance measures used by English SMEs as follows: productivity, quality performance, financial, innovation, employee learning, customer performance, meeting customer requirements, customer satisfaction and delivery for the customer. This provides a broad-based basis for measuring performance unlike

Kaplan and Norton (1992)‟s balanced scorecard which uses four (4) broad groups of performance measures: financial, shareholder value, customer service, innovation and internal processes. Bond (1999) used 6 performance measures: quality, delivery reliability, customer satisfaction, cost, safety and morale whilst Salaheldin (2009) refers to 14 performance measures as follows: cost reduction, waste reduction, quality of products, flexibility, delivery performance, revenue growth, net profits, profit to revenue ratio and return on assets. The rest are: investments in R & D, capacity to develop a competitive profile, new products development, market development and market orientation. The differences seen in the groups demonstrate that generally, financial measures are the most widely used whilst innovation and learning measures are the least used (Sousa et al., 2006). It is recommended that non-financial measures such as productivity, employee training and customer requirements be used more (Sousa et al., 2006) to ensure balanced business and organisational growth. The use of performance measures is an effective way to increase business profitability and competitiveness with financial measures the predominant option (Tangen, 2003). The reluctance to adopt newer performance measures can be attributed to the fact that neither industry nor academia have agreed on what new measures to use, a situation which is not made any easier by the ever growing list of performance measures (Tangen, 2003). Tangen (2003) proposes the following performance measures: financial, activity based costs, productivity measures, cost measures, quality measures, speed measures, dependability measures and flexibility measures.

The Malcolm Baldridge National Quality Award (MBNQA) is the top-most quality award that rewards organisations which attain performance excellence in the United States of America (USA). BNQP (2008) outlines the performance measures used in MBNQA as follows: product reliability, on-time delivery, customer-experienced defects level, service response time, customer retention, complaints and customer survey results. Others are return on investment, value added per employee, debt-to-equity ratio, return on assets, performance to budget and amount in reserve funds, cash-to-cash cycle time, profitability and liquidity measures and market gains. The rest are cycle time, productivity, waste reduction, workforce turnover, workforce cross-training rates, regulatory compliance, fiscal accountability and community involvement. These measures provide a basis for assessing excellence amongst organisations.

Introduced in 2007, the Scottish Construction Industry‟s KPI Framework aims at encouraging organisations at every level within the Scottish Construction Industry to adopt performance measurement. It comprises of 9 KPI streams: product, service, quality, time, cost, safety, environment, people and business (SCC, 2009).

The Construction Task Force (1998)‟s Rethinking Construction Report identified seven (7) indicators of performance – capital cost, construction time, predictability, defects, accidents, productivity and turnover & profits. The report proposes year-on-year improvements which should be targeted across the industry. This agrees with Robinson et al. (2005) that measures should allow management to evaluate year-on-year performance and be SMART – specific, measurable, attainable, relevant and timely.

Following the Egan Report, The KPI Working Group (2000) developed KPIs Framework for the UK construction industry with seven (7) groups. These are: time, cost, quality, client satisfaction, client changes, business performance and health & safety. The KPI Working Group (2000) indicators are categorized into headline, operational and diagnostic indicators. The Headline Indicators provide a measure of the overall "rude" state of health of a firm, Operational Indicators bear on specific aspects of a firm‟s activities and should enable management to identify and focus on specific areas for improvement, whilst Diagnostic Indicators provide information on why certain changes may have occurred in the headline or operational indicators (The KPI Working Group, 2000).

Ashton (2007) identified six top performance measures of best-practice as follows:

- Customer (including customer satisfaction, customer loyalty and repeat orders);
- People and HR related – e.g.   satisfaction and individual performance;

- Process effectiveness - e.g. new product lead times, deliveries, stock turns;
- Productivity – e.g. operational efficiencies, yields, units produced per hour;
- Financial – e.g. reduced costs, revenue and profits; and Quality – defects / cost of quality.

Prabhu et al. (2000) explored how world-class performance is affected by ISO 9000 and Total Quality Management (TQM). Six (6) indicators of best practice and performance are identified as follows – leadership, people, processes, people satisfaction, processes, customer satisfaction and operation performance.

Nearly all the performance measures discussed so far fit into one of three broad categories financial, technical and efficiency performance indicators – identified by Zairi (1994). These three categories represent business performance, productivity and human contribution measurements respectively (Zairi, 1994).

3.8.2.1 Auto Industry KPIs

Smith (2001) developed a series of KPIs for different operations within the auto industry as shown in Table 3.6. Smith (2001) focuses mainly on financial measures and thus provides an indication of the financial performance of organisations.

Table 3.6: Auto Industry KPIs

Absorption %	Interest Cover
Acid Test	Investment Loan Repayment %
Breakeven Volume	Loan Repayment %
Capital Employed	Net Profit After Interest % (N.P.A.I.)
Cash Profits	Net Profit Before Interest % (N.P.B.I)
Circulation of Current Assets (C.O.C.A.)	Return on Investment% (R.O.I)
Circulation of Funds Employed (C.O.F.E.)	Return on Net Worth
	Return on Own Funds
Current Ratio	Return on Sales% (R.O.S)
Debtor Creditor Ratio	Working Capital
Debtor Days	Working Capital Ratio
Debt Equity Ratio	Work-in-progress
Equity %	Operating profit
Fixed Asset %	Productivity
Funds Employed	Gross profit
Gearing Ratio	Lead time
Gearing%	Lost time
Interest %	

Source: Smith, (2001)

3.8.2.2 UK Construction Industry KPIs

In the UK, Constructing Excellence in the Built Environment publishes KPI Wallcharts each year for different groups in the UK construction industry. These are: the UK Economic KPIs (all construction), Environment KPIs, Respect for People KPIs, Consultant KPIs, and Construction Products KPIs, Repairs & Maintenance and Refurbishment (Housing) KPIs, Repairs & Maintenance and Refurbishment (Non-housing) KPIs, Housing KPIs, Infrastructure KPIs and ME Contractor KPIs. The ME Contractor KPIs are prepared by BSRIA.Table3.7 shows the different sets of KPIs prepared for the different areas of the Construction Industry.

Constructing Excellence (2010) identifies eight (8) KPIs for the Economic KPIs (all construction) as follows:

i. Client satisfaction - Product, Service and Value for Money (VfM); ii. Defects; iii. Predictability (Cost and Time); iv. Profitability; v. Productivity; vi. Safety; vii. Construction cost; and viii. Construction time.

Table 3.7 UK Construction Groups' KPIs

New-Build KPIs (Housing)	**New-build KPIs (Non-Housing)**	**R&M and R KPIs (Housing)**
Client Satisfaction	Client Satisfaction	Client Satisfaction
Cost	Cost	Cost
Time	Time	Time
Defects	Defects	Defects
Predictability	Predictability	Predictability
Productivity	Productivity	Productivity
Profitability	Profitability	Safety
Variance	Safety	Variance

	Variance	
R&M and R KPIs (non-Housing) Client Satisfaction Cost Time Defects Predictability Productivity Profitability Safety Variance	**Repairs KPIs** Client Satisfaction Cost Time Defects Predictability Productivity Profitability Safety Variance	**Housing KPIs** Client Satisfaction Cost (rent loss) Productivity Profitability Quality / defects Resident satisfaction Safety Time to re-let
Infrastructure (KPIs) Client Satisfaction Cost Time Defects Predictability Productivity Profitability Safety Variance	**Respect for People** Employee Satisfaction Equality / Diversity Investors in People Pay Qualifications & Skills Safety Sickness Absence Staff Turnover Training Travelling Time Working Hours	**Environment KPIs** Commercial Vehicle movement Energy Use Impact on Biodiversity Impact on the Environment Mains Water Use Waste Area of Habitat Retained Energy Use Impact on Biodiversity Impact on the Environment Mains Water Use (Designed) Whole Life Performance
M&E Contractors KPIs Client Satisfaction Contractor Satisfaction Defects Environmental Impact of installation Predictability Productivity Profitability Safety (Air) Training	**Consultants KPIs** Client Satisfaction Productivity Profitability Training	**Construction Products KPIs** Customer Satisfaction Energy Consumption Packaging Management Transport Movement Waste reduction Water Usage Equality and Diversity People Qualifications Safety at work Sickness Absence Training

(Source: Constructing Excellence, 2011) Constructing Excellence (2006) provides extra information which can enable organisations which adopt performance measurement to better analyse their performance. The additional performance indicators presented in Constructing Excellence (2006) fall into three categories as follows:

i. KPI charts for major sub-divisions of the industry (housing, repair and maintenance and refurbishment & infrastructure); ii. Graphs that provide additional analysis of the headline KPIs (e.g. predictability of cost analysed by project size); and iii. Extra indicators requested by users (e.g. contractor satisfaction with client).

3.8.2.3 Danish Construction Industry KPIs

In Denmark, contractors bidding for jobs since 2005 have had to demonstrate competence in a set of fourteen (14) KPIs which were used in the Danish Construction Industry. The Danish KPIs are based on the UK construction industry‟s system of KPIs and are as follows:

1. Actual construction time;
2. Actual construction time in relation to planned construction time;
3. Actual construction time including remediation of defects in relation to planned construction time;
4. Remediation of defects during the first year after handing over;
5. Number of defects entered in the handing-over protocol;
6. Accident frequency;
7. Contribution ratio;
8. Contribution margin per man hour;
9. Contribution margin per wage crowns (Danish crowns);
10. Work intensity in man hours per m;

11. Labour productivity;
12. Changes in project price during the construction phase;
13. Square meter price; and
14. Customer satisfaction with the construction process.

(Source: BEC, 2010)

BEC (2010) however identifies ten (10) KPIs in use as of 2010 which were used to benchmark contractor performance for Danish contractors. These are:

1. Actual construction time in relation to planned construction time;
2. Number of defects entered in the handing-over protocol, classified according to degree of severity (4 KPIs);
3. Economic value of defects;
4. Defects in delivery which hamper, or actually prevented the intended use of the essential parts of the building;
5. Accident frequency;
6. Customer satisfaction with the construction process; and
7. Customer loyalty.

Whilst the main constituents of the two versions of the Danish Construction KPIs are similar, there are significant variations. For the purposes of this study, the more recent version of Danish Construction KPIs from BEC (2010) is used. The BEC (2010) KPIs are used to produce a Grade Book for each Contractor. The grades represent the average performance of contractors over a three-year maximum period based on assessments in the respective KPIs for each contract or construction activity. The Danish KPIs place a lot of emphasis on *defects* to the exclusion of other equally relevant indicators such as cost, environment, business performance, productivity and the management of human resource (BEC, 2010). The earlier version of the Danish KPIs however includes some consideration of costs and price in some form and labour productivity (BEC, 2010). Business results and environmental performance are not directly provided for.

3.8.2.4 Construction Industry Institute (CII) KPIs

The Construction Industry Institute (CII) of the United States of America (USA) has 4 main areas for benchmarking comprising Performance, Construction Productivity, Engineering Productivity and Practices. These measures are broken down into their respective sub-areas for effective measurement. Performance for example covers the sub-areas: cost, schedule, changes, work hours and accident data, project impacts and re-work (CII, 2012). Whilst the CII KPIs has fewer categories of measures than others such as the UK and Danish Construction Industry KPIs, the CII KPIs has many sub-areas which incorporate many of the key measures used in the UK and Danish construction industries.

3.9 CONTRACTOR PERFORMANCE EVALUATION IN THE DANISH CONSTRUCTION INDUSTRY

The Benchmark Centre for the Danish Construction Sector (BEC) produces a Grade Book for all Danish Construction firms which can be used to assess contractor performance. For each such activity, a Factsheet is issued. According to BEC (2010), each Factsheet is valid for three years and the company‟s Grade book contains the average of each KPI in the company‟s valid Factsheets. When calculating the Grade book the KPIs from each factsheet are weighted with the contract price of the particular task. The Grade book is automatically updated when the company receives a new factsheet and when a factsheet is no longer valid.

Whilst it is a legal requirement for contractors bidding for certain categories of projects to provide a Grade Book, the decision to subject a contractor‟s project(s) to evaluation is entirely voluntary. Again, the Grade Books are produced at the request of clients only by the contractor involved (BEC, 2010). This ensures the confidentiality in relation to individual contractors‟ performance and enhances the trust of contractors in the system.

The Grade Book is produced using the BEC (2010) set of ten (10) contractor KPIs. The contractor‟s Grade in each KPI features the average performance of the contractor over a three-year maximum period. This is based on assessments in the respective KPIs for each contract or construction activity. The company is provided with a Grade book for the contracts it has had evaluated. The Grade book is a dynamic entity that changes continuously. It must state how many construction projects have been evaluated and their scale. The more projects in the Grade book, the more reliable the indicators (BEC, 2010). A grade book cannot be used until at least three projects have been evaluated. The projects must have been completed within the last three years. This ensures that the companies are judged on their current performance (BEC, 2010).This ensures that the Grade Book gives a fair reflection of the overall performance of contractors and reflects the current performance of the contractor. Again projects which are more than three years are taken out of the grade book (BEC, 2010). In addition to ensuring that the grade book reflects current performance, deleting records which are older than three years ensures that where previous performance has been poor, contractors are provided a fresh opportunity and motivation to improve performance.

BEC staff subjects all data submitted by contractors to rigorous scrutiny to ensure accuracy. Secondly, some projects may be selected for random checks by the BEC staff. Thirdly data – where applicable – are subject to confirmation by other parties involved in projects. So if the client gives information about defects for example, these may be passed on to the contractor to confirm the details as supplied by the client (BEC, 2010). These checks ensure the integrity of the information provided by the contractors in relation to evaluated projects and prevents arbitrariness in the data supplied by respondents. In addition to the contractor Grade Books, BEC produces Grade Books for consultants and clients as well.

CHAPTER FOUR

DEVELOPMENT AND VALIDATION OF RESEARCH DELIVERABLES

4.1 INTRODUCTION

This chapter discusses the processes leading to the development of the Benchmarking Framework for Ghana‟s construction industry and a Performance Measuring Tool for Ghanaian construction contractors. As part of this process, literature on benchmarking framework development was reviewed. The weaknesses and strengths of the respective frameworks reviewed were considered.

To assess the robustness, usability and usefulness of the key outputs of this study, they were tested using a range of methods, including peer-review and a survey of key stakeholders in the Ghanaian construction industry. This chapter describes the methods and results obtained from the validation of the key research outputs of this study. The main points and feedback received are highlighted as well as the actions taken to address the issues raised.

4.2 BENCHMARKING FRAMEWORK DEVELOPMENT

Voss et al. (1994) proposed a generic six-step procedure for developing benchmarking frameworks as follows:

i. Identifying the business process to be benchmarked; ii. Using a "top-down" approach to develop a framework of benchmarked processes; iii. Using "bottom-up" approach to identify sub-processes and best practice features; iv. Developing metrics for each process;

v. Developing self-assessment score-cards, tools and benchmarking frameworks; and

vi. Testing frameworks and tools for usability and usefulness.

The Baldridge Award and the EFQM are two of the most commonly used tools for benchmarking and self-assessment in Europe and the USA. Like these two models, any process, tool or model for benchmarking should pay attention to its use for self-assessment. Generally, benchmarking and self-assessment go hand-in-hand and should be integrated with self-assessment should precede benchmarking (Voss et al., 1994).

In developing the Benchmarking Framework for Ghanaian Contractors, existing benchmarking frameworks as well as literature on benchmarking frameworks and models for performance improvement as well as international awards for performance excellence have been reviewed. In the review, the design and operation of the respective models have been analysed. The strengths and weaknesses of the existing benchmarking frameworks have been identified. Due consideration has been made for the strengths and weaknesses of the existing benchmarking frameworks reviewed. The processes involved in the benchmarking process identified from the review have been arranged in a logical sequence taking cognisance of the construction process. The framework has been adapted to incorporate both organisational and project success. Whilst the framework is not meant to be prescriptive, a set of CSFs, KPIs, outcomes and world-class attributes have been provided to make the benchmarking process easier for construction firms which have little or no experience of benchmarking.

Amongst the frameworks reviewed were the Deros et al. (2006) Benchmarking Framework, the Friday-Stroud & Sutterfield (2007) Model, the Voss et al. (1994) Model, the Fong et al. (2001) framework, the Baldridge Award Model, the EFQM Model and the Bassioni et al. (2008) Model. Others included Camp (1989)‟s Xerox benchmarking model, the Anand and Kodali (2008) model, Spendolini (1992)‟s framework, and the Zairi (1994) model. In addition to the benchmarking frameworks, the EFQM, MBNQA, Deming Prize were reviewed thoroughly as well as the Six Sigma Principles, de Waal (2007)‟s High Performance Organisations framework and Bassioni (2008)‟s model for construction excellence. Some of these frameworks reviewed were developed from previous extensive reviews. For example, the Deros et al. (2006) Model was developed from a review of twenty (20) existing models. The inclusion of these models in this study therefore indirectly considers the Models included in the Deros et al. (2006) study and provided useful insights into the form and design of a framework.

In the review of existing benchmarking frameworks and existing programmes and models for improving performance, the critical success factors (CSFs) responsible for business success and the key performance indicators (KPIs) used to measure performance excellence globally were identified. The CSFs and KPIs identified have been adapted to the Ghanaian construction industry to reflect the peculiarities of Ghana‟s industry and its priorities and incorporated into the Benchmarking Framework developed in this study (fig.4.1).

4.3 GHANAIAN CONTRACTORS' BENCHMARKING FRAMEWORK

The benchmarking model developed in this study presents the systematic steps for benchmarking between Ghanaian contractors and global best-in-class.

The benchmarking implementation steps developed imply that for Ghanaian construction firms to successfully initiate and implement benchmarking programmes, they should have the support of top management who set the vision for the overall process. This allows for both organisational and project success to be targeted. From the list of possible variables, a selection is made of the CSFs or KPIs seen to be most critical for the attainment of the desired objectives.

The selected variables will determine the outcomes realised. The list of CSFs/ KPIs provided in the framework is neither prescriptive nor exhaustive but provides organisations with little or no experience of benchmarking with a range of possible outcomes. The outcomes consist of hard and soft measures and are dependent on the choice of CSFs or KPIs chosen for benchmarking. The outcomes are compared with "world-class attributes" to verify if the performance level attained compares with that of global leaders. If internationally competitive level of performance has been attained, the process may be restarted as part of continuous improvement efforts or discontinued.

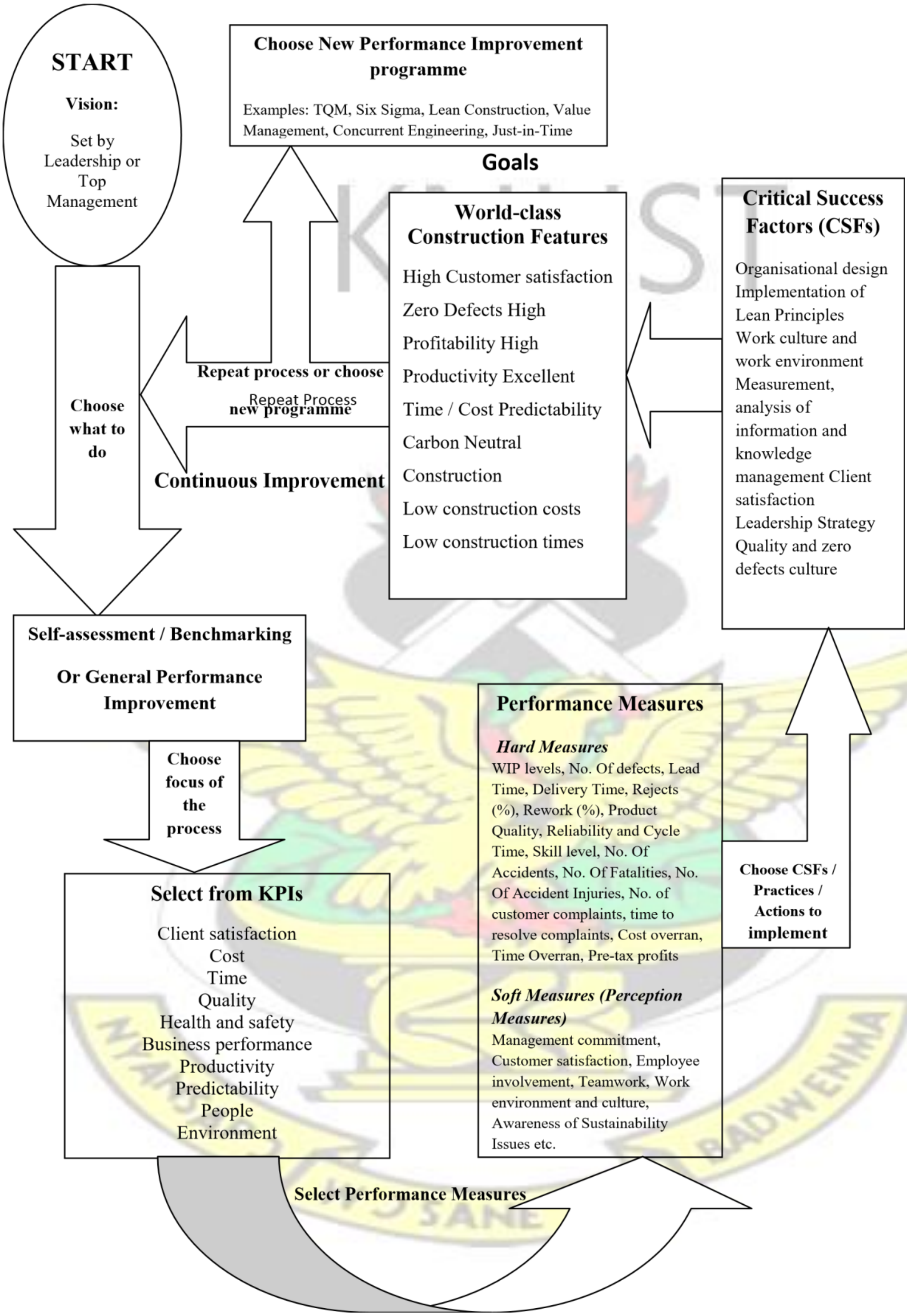


Fig 4.1 Benchmarking framework for Ghanaian contractors (Ofori-Kuragu and Baiden (2008)

4.4 DEVELOPMENT OF BENCHMARKING STEPS

In this section, existing benchmarking frameworks are reviewed to establish the main steps involved in the benchmarking processes for most of the existing benchmarking models. The most common steps are adapted for use in the Ghanaian Benchmarking Model.

Anand and Kodali (2008) used the Xerox Benchmarking Model (Camp 1989) to benchmark existing benchmarking models to identify the best practices mainly used in benchmarking. Thirty five (35) benchmarking models were benchmarked against the original benchmarking model developed by Xerox leading to the development of a 12-step benchmarking model as outlined as follows:

i. Team formation;

ii. Subject identification; iii. Customer validation; iv.

Secure management commitment;

v. Self-analysis including identification of CSFs / measurement of CSFs and performance measures; vi. Select partners; vii. Pre-benchmarking activities; viii. Benchmarking; ix. Gap analysis;

x. Action plans; xi.

Implementation; and xii.

Continuous improvement.

The Anand and Kodali (2008) model compares with the 10 steps of the Xerox model – the foremost model (Camp, 1989) as follows:

i. Identify the benchmarking subject; ii.

Identify the benchmarking partners; iii.

Determine data collection method; iv.

Determine current competitive gap;

v. Project future performance; vi.

Communicate findings and gain acceptance; vii.

Establish functional goals; viii. Develop

action plans; ix. Implement action plans; and

x. Recalibrate the benchmark.

Whilst the Anand and Kodali (2008) model sought to address some of the perceived weaknesses of the Xerox Model, both models are dependent on the involvement of a "benchmarking partner". However, the issue of "identifying suitable partners" is one of the main problems associated with the implementation of benchmarking programmes (Hinton et al, 2000). The problem of finding suitable partners affects smaller contractors most since the potential for reciprocal benefits to the benchmarking partner is minimal and thus provides little motivation for the more successful partners to engage. The model developed in this study reduces the dependence of benchmarking on a third-party benchmarking partner.

Spendolini (1992) developed a simple five-stage generic benchmarking model as follows:

i. Determine what to benchmark; ii. Form a

benchmarking team; iii. Identify suitable

benchmarking partners; iv. Collect and analyse

benchmarking information; and

v. Take action.

Whilst the Spendolini (1992) model has fewer steps than most of the others, yet it covers most of the steps which are common to the other models. The Malaysian Benchmarking Service, NPC (1999) framework is outlined as follows:

1. Agree on benchmarking topic;
2. Finalise on scope: Measures and Definition;
3. Data collection survey;
4. Share strengths;
5. Site visit;
6. Data collection site visit;
7. Share findings;
8. Planning for adopting best practices;
9. Implementation of best practices;
10. Monitoring of results;
11. Standardisation; and
12. Daily control.

The Voss et al. (1994) framework consists of six generic steps as follows:

i. Identify business process to be benchmarked; ii. Develop overall framework of processes to be benchmarked using "top-down" approach; iii. Identify sub-processes and characteristics of best practice using literature and knowledge of best practices; iv. Develop metrics for each process;

v. Develop tools, self-assessment scorecards and benchmarking frameworks; and vi. Test frameworks and tools for usability and usefulness.

Zairi (1994) identified two stages involved in the benchmarking processes referred to as the effectiveness and competitiveness stages respectively. The effectiveness stage relates to the internal processes of the organisation whilst stage 2 relates to improving competitiveness.

The competitiveness stage of the Zairi (1994) framework is made up of nine steps as follows:

i. Select process suitable for benchmarking;

ii. Identify suitable partners; iii. Agree on measurement strategy; iv. Compare standards;

v. Understanding why difference in performance; vi. Change relevant practices for improving performance; vii. Compare standards;

viii. Repeat experience with same / new partners on a regular basis; and

ix. Apply benchmarking to all processes.

Fong et al. (2001) developed a framework for benchmarking the Value Management process. Based on a review of literature, the critical success factors and related performance metrics were identified which could be "applied to different work processes across different. From the review of literature, Fong et al. (2001) identified eight stages common to benchmarking:

i. Deciding what to benchmark; ii. Understanding your own performance; iii. Identifying the best performers for comparisons including direct competitors, best-in-class organisations and or the best performers in internal functional areas;

iv. Collect and analyse data;

v. Determine current performance levels and project future performance levels; vi. Gain acceptance and establish functional goals; vii. Develop action plans and implement the best practices; and viii. Monitor progress and re-calibrate the benchmark measures.

Apart from minor variations, there is a measure of consistency amongst the key processes involved in the different benchmarking frameworks reviewed in this study.

4.4.1 Benchmarking Process

Many benchmarking models are based on the ten steps of the Xerox model, the foremost benchmarking model developed from a study of 35 benchmarking models which were benchmarked against the original Xerox model. Arising from this study, a ten (10)-point process for benchmarking was developed which is used in this study. The 10 stages are:

1. Vision or objectives set by Leadership / Management;
2. Decide what to do;
3. Select KPIs;
4. Select measures of performance;
5. Select success criteria;
6. Take action;
7. Collect data on results;
8. Assess performance;
9. Compare results with objectives (to match best-in-class performance); and
10. Choose new improvement programme, repeat process for new targets or end process.

4.4.2 How Ghanaian Contractor Benchmarking Framework Works

The Benchmarking Framework developed for Ghanaian contractors can be used for selfassessment and to benchmark performance against best-in-class organisations. In all cases, top management initiates and sets the vision for improvement. Next, the focus for the exercise is decided from a choosing from: self-assessment, benchmarking or general improvement. The performance areas (KPIs) which need improvement are selected together with relevant measures of performance (sub-criteria) and then the critical success factor (s) required to achieve the vision set by management should be selected. Following action to implement the success factor, the results are assessed in the context of the appropriate KPIs and the associated performance measures. These results are then compared with the levels of performance associated with the best-in-class whether in the construction industry or other leading industries. Depending on the results achieved, the process of on-going continuing improvement proceeds with either new KPIs selected or a different performance improvement technique may be used. The step-by-step process is outlined in the Benchmarking Implementation Framework outlined in Fig 4.2

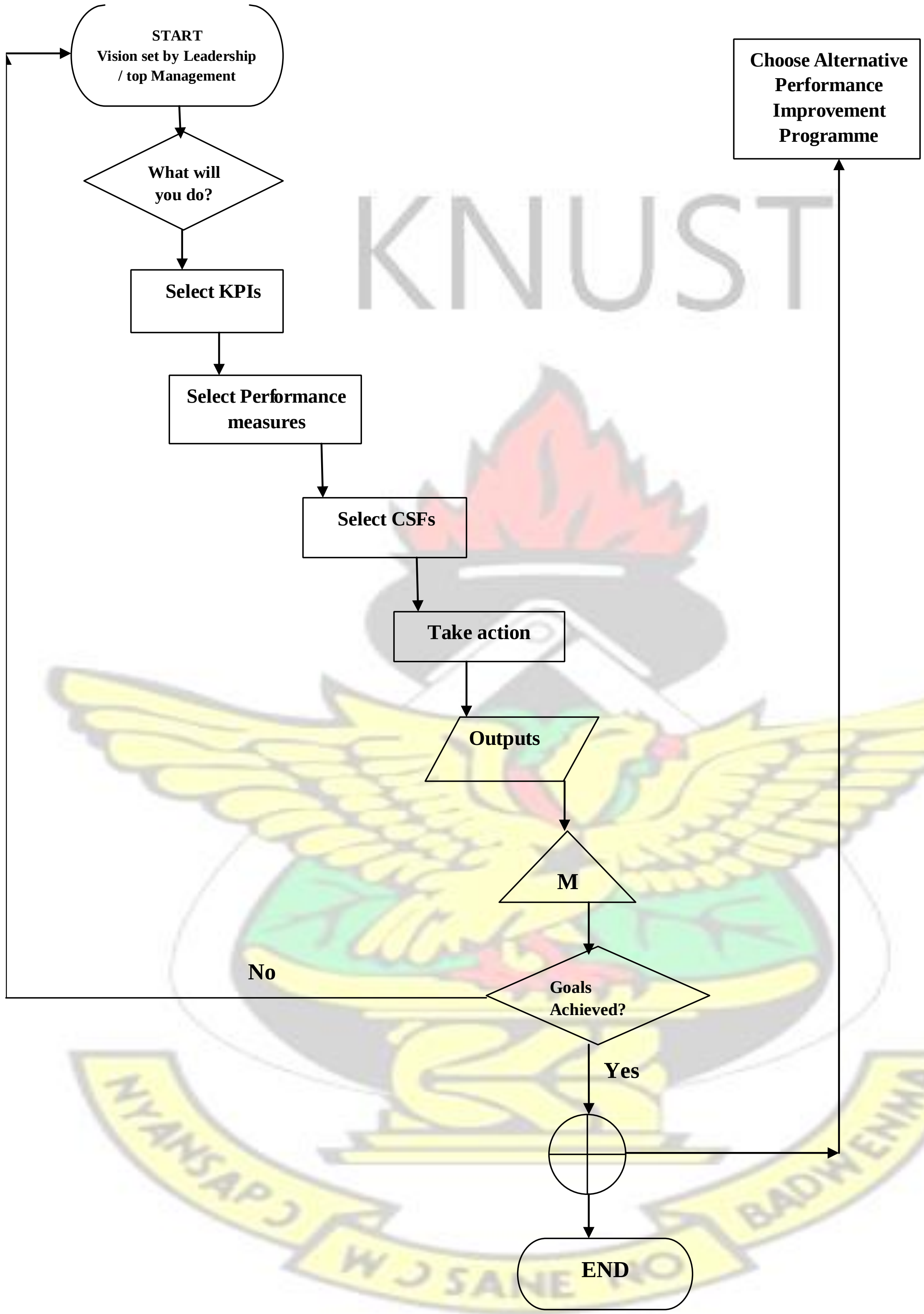


Fig. 4.2 Ghanaian Contractors Benchmarking Implementation Model

4.5 DEVELOPMENT OF PERFORMANCE MEASUREMENT TOOL

In developing a Performance Measurement tool for Ghanaian Construction Firms, the systems used in UK and Danish Construction Industries were compared.

In the UK Construction Industry, charts are developed for each of the major sub-divisions of the industry as well as graphs for each of the headline KPIs. The graphs are developed using performance data for the respective headline KPIs collected across the entire construction industry.

Constructing Excellence (2006) outlines the following steps for using the graphs to calculate a company or project"s benchmark score:

1. Select the appropriate graph
2. Plot the measured performance for the project or company under consideration on the vertical axis (1).
3. Read across to the performance line (2). If the graph line is intersected where it runs horizontally, follow the graph line to the last point of contact.
4. Read down to the horizontal axis (3). This is the company/project benchmark score out of 100%.
5. Plot the benchmark score on the appropriate axis of the radar chart.
6. Join with a line all plots on the radar chart.

   In general, the nearer the plotted line is to the outer perimeter of the chart, the higher the overall performance.

Using these steps, the benchmark score for a project or organisation can be calculated. This can also help to compare an organisation"s performance with the rest of the industry since the graphs are developed with data from across the entire industry.

In the context of the Ghanaian construction industry however, the non-availability of reliable project data will affect the quality of graphs developed if they are based on largely unreliable data from construction firms. In most cases, Ghanaian construction firms do not keep sufficient organisational, project or performance data. This may be due to the absence of suitably qualified staff to keep such records. In other cases, construction firms are unwilling to share the correct data relating to their firms for tax purposes. The potential for success of this approach to benchmarking is therefore limited in the Ghanaian context.

The Danish Construction Industry KPIs are derived from the UK Construction Industry KPIs. In the use of the Danish KPIs as an assessment tool, information relates to particular construction firms so problems associated with data relating to particular firms will not affect the integrity of the entire system. This makes the Danish system easier to adapt for the Ghanaian Construction Industry.

The proposed Performance Measurement System (PMS) for Ghanaian contractors consist of two separate tools – the Project Scoresheet (***ProScor***) and the Contractor Scorecard (***ConScor***). ***ProScor is*** used to measure contractor performance on specific projects whilst ***ConScor*** tracks the overall performance of contractors over a number of projects. Generally, projects included in ***ProScor*** and ***ConScor*** should not be more than three years old. This allows for only projects which are fairly representative of the company"s current performance. Both tools are based on the set of 10 KPIs developed in this study for Ghanaian contractors. Provision is made for sub-criteria for the respective performance indicators.

ProScor allows for details of projects to be noted to prevent multiple counting of projects. The project types are also specified from a range of three – new build, renovation and civil engineering or road projects. Consideration is given to mitigating circumstances that may have negatively impacted on performance to be recorded. Contractors are specifically asked if particular projects should be included in their project record. Where extenuating circumstances are determined, discussions should be held with the contractor to determine whether or not to include the projects involved in the scoresheet.

4.5.1 Verification of Contractor Self-Assessment

It is proposed that both ***ProScor*** and ***ConScor*** shall in the first instance be completed by the contractor with a provision for the consultant or client to confirm or otherwise the contractor"s version of records.

It is proposed that an independent body be established to independently verify the details submitted by the contractor using documentation and records provided by the contractor, consultant and client. To ensure its complete independence, the Centre for Construction Excellence (CCE) could be set up to oversee the process. The proposed CCE may be based at the Kwame Nkrumah University of Science and Technology (KNUST)"s Department of Building Technology. To be successful, there must be strong collaboration between the governmental departments and ministries responsible for construction such as the Ministry of Works and Housing (MoWH), Ministry of Roads and Transport, Department of Feeder Roads and the Highway Authority as well as Contractor associations with support from key stakeholders such as the donor community. The proposed CCE will cross check all details submitted by contractors using project documents and in consultation with consultants and clients. Where decisions regarding specific projects are not agreed, it is proposed such projects should be excluded from the records.

Table 4.1 Contractor Scorecard for Ghanaian contractors (ConScor)

CONTRACTOR SCORECARD (*ConScor*)			
Construction Company			**Financial Class**
Project type	**Number of projects Evaluated**	**Total contract sum for evaluated projects (in millions GH¢)**	**Number of projects on which evaluation abandoned (see note)**
New build			
Repairs and maintenance			
Roads / civil works			
Performance Indicator	**Sub-criteria**		**Company average score**
Client satisfaction	Client Satisfaction(Product)		
	Client Satisfaction (Service)		
Cost			
Time			
Quality	Defects at available to use		
	Defects after defects liability period		
Health and safety	Reportable accidents (incl. Fatalities)		
	Reportable accidents (excluding fatalities)		
Productivity			
Business performance	Pre-tax profit		
	Operating profit		
	Turnover		
Predictability	Cost Predictability		
	Time Predictability		
People			
Total Score			

***ConScor* Index Score**	

Table 4.2 Project Scorecard for Ghanaian contractors (ProScor)

PROJECT SCORESHEET (*ProScor*)			
Construction Company			**Class:**
Project type (tick one)	**Project Description and location**	**Project start and finish dates**	**Total contract sum expressed in million GH¢**
New build			
Repairs and maintenance			
Roads / civil works			
Performance Indicator	**Sub-criteria (if any)**		**Project score**
Client satisfaction	Client Satisfaction(Product)		
	Client Satisfaction (Service)		
Cost			
Time			
Quality	Defects at available to use		
	Defects after defects liability period		
Health and safety	Reportable accidents (incl. Fatalities)		
	Reportable accidents (excluding fatalities)		
Productivity			
Business performance	Pre-tax profit		
	Operating profit		
	Turnover		
Predictability	Cost Predictability		
	Time Predictability		
People			
Total Project Score			
***ProScor* Index Score**			
Is there any special event (s) which could have negatively impacted on performance on this project? Yes [ ] No [ ] If yes, please state briefly below and provide further details on reverse.			

Should this project be included in your performance scorecard? Yes [ ] No [ ]
THIS SECTION FOR EXTERNAL ASSESSOR'S USE: Can the project be included in the company's project record? Yes [ ] No [ ]

CHAPTER FIVE

METHODOLOGY AND METHODS

5.1 INTRODUCTION

This chapter explores the theoretical background to the methods used in this study. The chapter is divided into two (2) parts. The "methodology" section presents a general review of methods used in research. The different research approaches, conditions when they are used and their relative merits and demerits are evaluated leading to the selection of the most suitable methods for this study. The "methods" section of this chapter describes the specific research approaches used in undertaking this research and the justification for choosing these methods.

5.2 Methodology

Methodology is the science of finding out; a sub-field of Epistemology, which is described as the science of knowing (Babbie, 2007). Methodology in a research presents an exploration of the different possible approaches which can be used to achieve the objectives of the research. The methodology adopted for a study affects the research design, the tools used and general methods used for the research. In this section, research approaches are explored leading to the selection of the methods used in this study and the justification for selecting these. The chapter also gives a narrative of how the specific research objectives are achieved.

5.2.1 Research Design and theory

Dainty (2008), published in Knight and Ruddock (2008) defined research design as the ways in which data is collected and analysed in order to answer the research questions explored in a research thus providing a theoretical framework for undertaking the research.

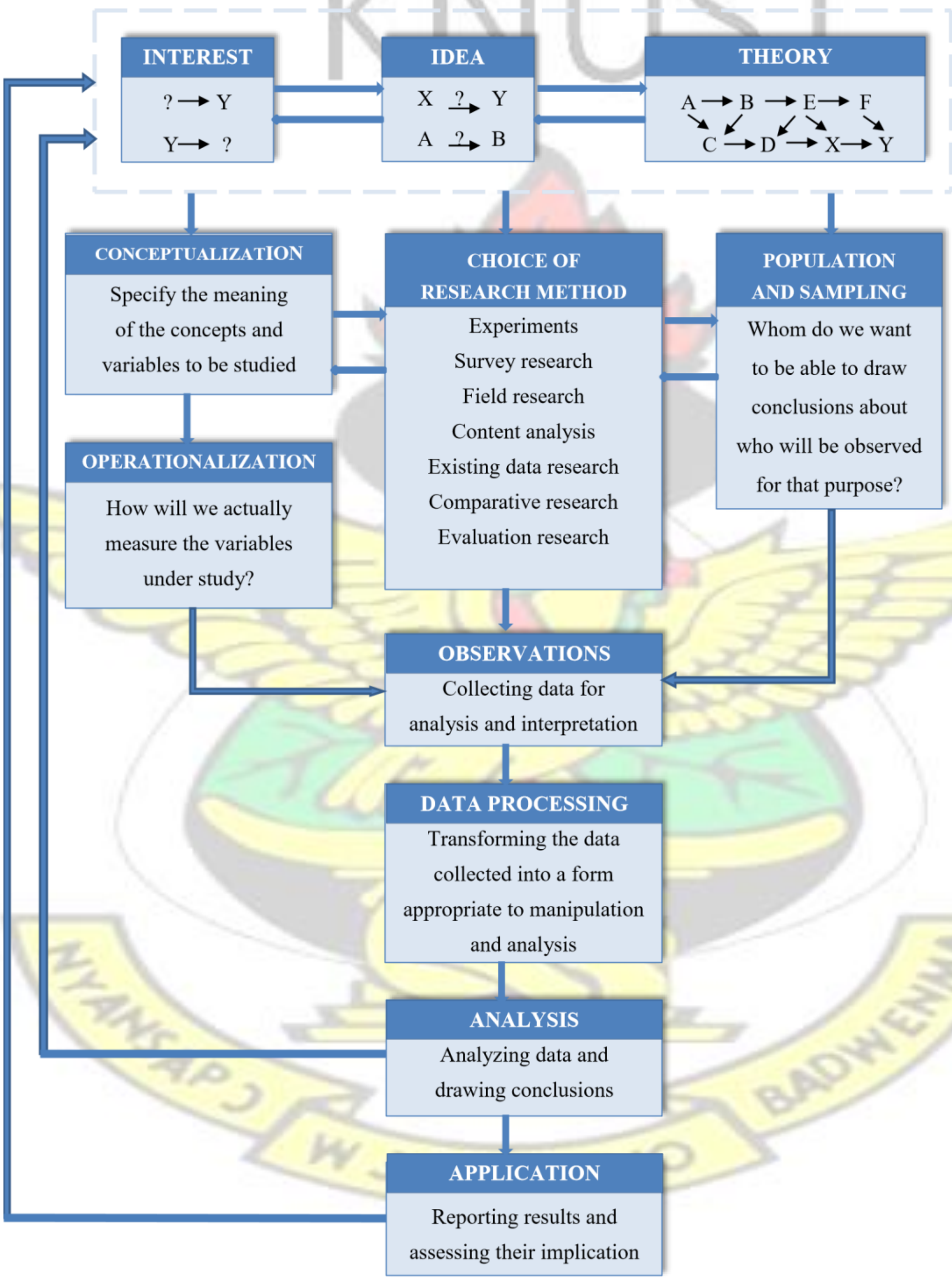


Fig. 5.1 Research design Source: Babbie (2007)

Research design occurs at the start of the research project and involves the respective steps followed during the research (Babbie, 2007). The design of a study according to Babbie (2007) starts with interest in an idea which leads to the development of the theory underpinning the study (fig. 5.1).

Theory may be described as a systematic explanation for the observations that relate to a particular aspect of life. Scientific theory relates to the logical aspects of scientific enquiry, data collection with the observational aspects whilst data analysis looks for patterns in observations and where appropriate, making comparisons between what is observed and what was expected (Babbie, 2007). Theory provides the framework for the research project and shows what data is required to be collected as well as the methods and techniques of analysis. It is essential that bodies of theory be examined, evaluated and be subjected to rigour of analysis to arrive at a theoretical basis or framework appropriate to proposed research (Fellows and Liu, 1997).

Fellows and Liu (1997) inferred that the theory adopted in a research provides the basic structural framework to identify and explain facts and relationships between variables. Thus in a research proposal, the identities and relationships between the variables should be determined from theory. Again theory should be used to build a model of the proposed research, including the variables and relationships, the points of issue and those of substantiation, hypotheses employed to fill in gaps and to suggest relationships which may exist if theory is extended (Fellows and Liu, 1997). The main activities to assembling theory and literature into a theoretical framework include:

i. Defining the topic and terms; time and cost limitations;

ii. Noting items of theory; and iii. Assembling the review.

Generally, four broad research classifications can be identified. These are quantitative, qualitative, mixed methods and reviews. Qualitative methods may comprise of semistructured or unstructured interviews, focus groups and group interviews, observations (participatory and non - participatory including ethnographic), document or other textual analysis and visual data analysis. Quantitative methods dominate construction industry research followed by those which use a mix of quantitative and qualitative methods. The qualitative approach to research is the least popular of the research approaches in construction related research (Dainty, 2008). Quantitative methods are based on numerical representation and analysis of data from observation whilst qualitative methods are based on subjective interpretation and analysis of observations (Babbie, 2007). This gives analysis based on quantitative data an edge over qualitative analysis.

Dainty (2008) makes a case for methodical pluralism which recommends the use of multiple theoretical models and methodical approaches in research. This provides a framework for the utilisation of multiple methodologies as a means to understanding or intervening in complex situations. Dainty (2008) identifies three classes of multi-strategy research: Triangulation, Facilitation and Complementarity. Triangulation is defined as the use of qualitative research to confirm the findings of a quantitative research, Facilitation as the use of one research approach as a way to help research using another approach and Complementarity as the use of two research strategies as a complement to each other in order to fit together different aspects of a research investigation (Dainty, 2008). In this study, methodical pluralism has been achieved through the integration of the outcomes of the literature study, field research and the validation exercise. The results from the different were mutually reinforcing and confirmed the validity of the final results of this study.

Two types of causal reasoning can be identified: idiographic and nomothetic reasoning. In idiographic causal reasoning, the idiosyncratic causes of a condition are exhausted to develop a fuller understanding of what happens in particular instances. In nomothetic explanation, an attempt is made to identify a few causal factors which generally impact a set of conditions or events (Babbie, 2007). This study employed the idiographic causal reason approach to explore the practices employed by the best-in-class firms and their features.

5.2.2 Inductive and deductive reasoning

There are two main reasoning approaches which can be used in the acquisition of new knowledge. These are deductive reasoning and inductive reasoning (Hyde, 2000). In the development of research theory, deductive reasoning involves the derivation of an expectation and a testable hypothesis from a general theoretical understanding (Babbie, 2007). It is an approach used for testing theory and commences with an established theory or generalisation. Further investigation is then undertaken to see if the theory applies to specific instances (Hyde, 2000).

Deductive theory building shows what is already known about a subject and helps identify patterns which can be tested by observation. It is the logical model in which specific expectations of hypothesis are developed on the basis of general principles. This moves from the general to the specific and moves from a pattern which is theoretically expected to observations which test whether the expected pattern actually occurs (Babbie, 2007). In the deductive model, research is used to test theories. It is a logical model in which general principles are developed based on specific observations. This involves using a set of specific observations to discover a pattern that shows a degree of order among all the identified events.

In the inductive model, theories are developed from the analysis of research data. It involves the direct observation of aspects of social life from which patterns are identified as a means to developing theory (Babbie, 2007). Inductive reasoning is used mainly in theory building. This starts with observations of specific instances or aspects of social life. From these observations, patterns are identified and from which generalisations are made about the phenomenon under investigation (Hyde, 2000). The wheel of Science (fig.5.1) shows the stages in the development of theory from hypothesis. This research is based on the deductive approach in which theories of performance and excellence are developed based on examples reviewed from literature and the review of existing models. Standards for the main concepts studied in this research such as KPIs and CSFs are established based on a study of trends amongst existing best-in-class performers.

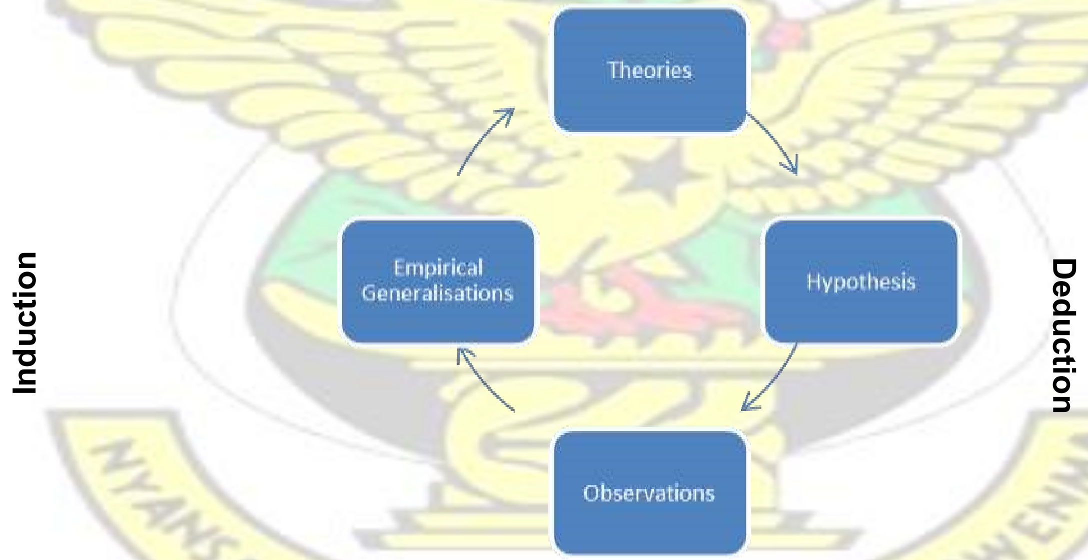


Fig. 5.2 The wheel of Science **Source: Babbie (2007)**

5.2.3 Hypothesis

This is defined as a testable expectation about empirical reality which follows from a more general proposition. A hypothesis is a statement of something which ought to be observed in the real world if a theory is correct (Babbie, 2007).

5.2.4 Research Paradigms

A paradigm defines the relevant problems, a „model" and a pattern of enquiry used in research. It represents a set of statements of assumptions and facts which represent the underlying ontological and epistemological position adopted (Fellows, 2010). It is a model or framework for observation, which shapes both what things are observed and how they are understood (Babbie, 2007).

According to Fellows (2010), researchers in the past had to adopt, articulate and justify their ontological and epistemological position and thus the research paradigm adopted such that the research methods, results and findings could be examined in context. The major research paradigm for construction and built environment research has been mainly positivistic and quantitative. As a later development, qualitative constructivist paradigm employing intepretivism, grounded theory and ethnomethodology was largely used (Fellows, 2010). The emerging trend for research in the construction and built environment employs multimethodology based on triangulation (Fellows, 2010). This approach has been used in this study using the field survey to confirm the findings arising from the literature review undertaken as part of this study and later validated using expert interviews.

5.2.5 Criteria for nomothetic causality

Babbie (2007) described three (3) main criteria for nomothetic causal relationships:

i. The variables must be correlated; ii. The cause takes place before the effect; and iii. The variables are non-spurious.

Correlation is an empirical relationship between two variables such that changes in one are associated with changes in another or particular attributes of one variable are associated with particular attributes of the other. Correlation in itself does not constitute causality but it is one criterion of causality. Causation is the strongest inference that can be drawn in research. It involves proposing a cause-effect relationship between two or more variables. The existence of causality cannot be inferred unless the cause precedes the effect in time. For causality to exist, the effect should not be explained in a third variable. Where there exists a coincidental statistical correlation between two variables which can be shown to be caused by a third variable, the relationship between the first set of variables is described as *spurious relationship* (Babbie, 2007).

An idiographic explanation of causation is relatively complete whereas a nomothetic explanation is probabilistic and usually incomplete. There may be exceptional cases in nomothetic explanations but these would not disprove a causal relationship. Causal relationships may be true even if they do not apply in the majority of cases. There are two types of causes: *necessary* and *sufficient* causes. In the case of a *necessary cause*, it describes a condition which must be present in order for the effect to follow whilst a *sufficient cause*, if present will guarantee the effect in question. This however does not imply that this will be the only possible cause of a particular effect (Babbie, 2007).

The correlation between CSFs and KPIs has not been investigated in this study but is one of the lines of enquiry proposed in this study for further research.

5.2.6 Conceptualisation, Dimension and Operationalisation

Conceptualisation is described by Babbie (2007) as the process in a research when the meanings of specific terms used in the study are explained. The process involves specifying indicators of the concept and produces an agreed-on meaning for the concepts used in the research. An indicator is an observation which is considered as a reflection of a variable which is studied during the research. There are times when there is no single indicator that gives a measure of a variable required and explains that if several indicators all represent the same concept to the same degree, then the indicators will behave in the same way as the concept (Babbie, 2007). "Dimension" is described as a specifiable aspect of a concept (Babbie, 2007). This describes specific sections of a concept which are measured in specified units. Operationalisation is the process of developing operational definitions or specifying the exact operations involved in measuring a variable. A variable may be operationalised in the form of a question (Babbie, 2007). The key concepts in this study have been identified and defined in chapter three of the thesis. These concepts have been adapted to the Ghanaian construction industry and operationalised through the development of a performance measurement tool which can be used to measure the performance of Ghanaian contractors.

5.2.7 Research styles

Fellows and Liu (1997) identified five research styles: Action, Ethnographic, Surveys and Experimental. Whilst survey techniques, such as questionnaires and interviews tend to be the most common style, they are highly labour intensive and thus may result in a low (25-35%) useable response rate (Fellows and Liu, 1997). Lower response rates mean such surveys do not produce data which can be used to make generalisations, however if done properly, survey research can be a useful tool of social enquiry (Babbie, 2007).

Questionnaire-based surveys may use open or closed-ended questions. In open-ended questions, respondents are given the opportunity to provide their own answers. Whilst this gives opportunity to thoroughly interrogate the issues involved, the difficulty is with the analysis where a wide variety of answers makes it difficult to analyse. In closed-ended questions, respondents are asked to select answers from a choice of options provided and thus provide a greater uniformity in the answers provided (Babbie, 2007). These are generally easier to analyse but require more skill to develop and to ensure that the answers provided cover the entire range of possible answers.

In this study, a questionnaire-based survey was used using closed-ended questions to ensure uniform responses which are easy to analyse. Opportunities were provided where necessary for respondents to provide further information where this clarified or gave reasons for responses.

5.2.8 Field research

Field research is the direct observation of events in progress. It is frequently used to develop theories through observation (Babbie, 2007). Whilst this method provides the opportunity to observe first hand as events take place, there is a limit to how many observations that can be made. It therefore requires great skill to identify how many observations are required for a given population and how to use these observations to make generalisations for the entire population. In the choice of methods for this study, it was the weaknesses associated with the focus group approach were considered stronger than the strengths. In particular the effect on the number of observations that can be undertaken led to the decision not to use the direct observation in this research. Instead respondents have been reached through simplified questionnaires which enabled respondents to provide the required information.

5.2.9 Focus groups

As a research method, focus groups present the best method for accessing group norms.

The discussions which occur within focus groups provide rich data on the group meanings associated with a topic (Bloor et al., 2001). Also called group interviewing, the focus group method is a qualitative method which may be based on structured, semi-structured or unstructured interviews (Babbie, 2007). Focus groups can be used to obtain data on the underlying meanings of assessments made by a group as well as data on the ambiguities and the processes which lead to assessments made by the group. They can clarify the normative understandings which are used as the basis upon which group assessments are made (Bloor et al., 2001). Focus groups provide rich qualitative information and can provide an essential link between qualitative and quantitative research stages. They can provide the vocabulary and hypotheses which are then tested by wider surveys (Jenkins and Harrison, 1992). The relevance of focus groups in academic research lies in the access they provide to group meanings, processes and norms and its potential to provide a platform for participants to articulate normative assumptions which would otherwise not be articulated (Bloor et al., 2001). This presents a clear advantage over questionnaire based surveys where respondents may apply subjective interpretations to questions. Groups of approximately 12 people (Bloor et al., 2001) – can be up to 15 people (Babbie, 2007) - may take part in focus group sessions. The focus group method of research is flexible with high face-validity, low in costs and able to produce speedy results. A major weakness of focus groups is that they may offer researchers less control than in individual interviews; that they may be difficult to analyse, and differences between groups may present problems (Babbie, 2007). Jenkins and Harrison (1992) explored some of the weaknesses of focus groups as a research method. The context of the group in focus group situations is described as being artificial and inappropriate to assess how individuals involved in Focus Groups will behave in their usual environment. It is suggested that the Focus Group process may present a picture which does not truly reflect individual beliefs and attitudes. The most fundamental limitation of the focus group is that the findings obtained using the focus group approach cannot be projected to the population as a whole (Jenkins and Harrison, 1992). Two focus group sessions were held with two different contractor groups to validate the key outcomes of this research. The reason for using focus groups was because it afforded an opportunity to further interrogate the choices and reasons offered by the respondents.

5.2.10 Sampling

Babbie (2007) identified two types of sampling methods: probability and Non-probability sampling and suggested that probability sampling in which selection of samples follow probability theory provide a more representative sample of the population being studied in a research. There are situations where probability sampling is not feasible. In such cases, nonprobability sampling is to be used. However non-probability sampling does not guarantee that the sample observed is sufficiently representative of the population being studied (Babbie, 2007). Hence in this study, probability sampling was used.

Probability sampling is based on the premise that a sample selected from a population must contain the same sort of variations that exist in the population if it has to be able to provide useful descriptions of the entire population (Babbie, 2007). Bias is introduced if the sample is not sufficiently typical or representative of the population from which the sample was selected. A sample is described as being representative of the population from which it is selected if all members of the population have an equal chance of being selected in the sample. Such samples are described as EPSEM (Equal Probability of Selection Method) samples, with the degree of representativeness of a sample affected by the size of the sample selected (Babbie, 2007). Random sampling is an approach to probability sampling which ensures that each element in a population has an equal chance of being selected which does not depend on any other event in the selection process. It is argued that this reduces the incidence of both conscious and unconscious bias as well as providing a basis for estimating the characteristics and accuracy of samples (Babbie, 2007). In this study, three types of sampling designs have been identified as follows: simple random sampling, systematic sampling and stratified sampling. In the selection of the respondents for this study, random sampling was used to choose the contractors interviewed to minimise the introduction of bias with an equal probability of respondents being selected.

5.2.10.1 Sample Size Determination

In determining sample size, the following three criteria should be specified: level of confidence (risk), level of precision and the degree of variability in the variables which are being measured (Israel, 2009). The *confidence level* or *risk level* shows the proportion of the sample which exhibits the true population value within the range of precision specified. The risk is reduced if a 99% *precision level* is chosen and increased if a 90% or lower *precision level* is chosen (Israel 2009). In this study, a *confidence level* of 95% has been taken which allows for a more moderate risk level.

Level of precision, also referred to as *sampling error* is described by Israel (2009) as the range in which the true value of a population is estimated to be – often expressed in percentage points. The *level of precision* is determined by the *confidence level.* For the 95% *confidence level*, the *level of precision*, e=0.05. Israel (2009) describes *degree of variability* in an attribute as the distribution of the attributes within the population explaining that more heterogeneous (variable) populations require larger sample sizes whilst less heterogeneous populations require smaller sample sizes to obtain a given level of precision. According to Israel (2009), a proportion of 0.5 indicates maximum variability in a population and is normally used in determining a more conservative sample size which may be larger than if the true variability of the population attribute were used.

Some of the strategies for determining sample sizes include: using a census for small populations of less than 200, using a sample size of a similar study, using published tables and using formulas to calculate the sample size. Israel (2009) identifies four formulae for calculating sample sizes. The first equation,

$n_0 = \frac{z^2 pq}{e^2}$ ....Equation 1

Where n_0 is the sample size, Z^2 is the abscissa of the normal curve that cuts off an area at the tails, e is the desired level of precision, p is the estimated proportion of an attribute that is present in the population and q is 1-p.

The value for Z is found from statistical tables which contain the area under the normal curve. Equation 1 is suitable for large populations. If equation 1 is used for smaller populations, the sample size n_0 may be reduced slightly and adjusted for using equation 2 below:

$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$ ....Equation 2

Where n is the adjusted sample, n_0 is the adjusted sample, N is the population. This adjustment, described by Israel (2009) as the *finite population correction* can substantially reduce the sample size for small populations. A simplified formula for sample size is:

$n = \frac{N}{1+N(e)^2}$ ....Equation 3

This simplified formula for computing sample size, n, Equation 3 is used for this study. Where n is the sample size, N is the population size and e is the level of precision. However for polytomous and continuous variables, the following formula may be used for calculating the sample size:

$$n_0 = \frac{z^2 \quad \alpha^2}{e^2} \qquad \text{..Equation 4}$$

Where n_0 is the sample size, z is the abscissa of the normal curve which cuts off an area at the tails; *e* is the level of precision desired and α is the variance of an attribute in the population. The disadvantage of using equation 4 is that whilst it requires a good estimate of the variance, in most cases, this is not available (Israel, 2009). In general, the sample size should be appropriate for the analysis which is intended. For example, whilst any sample size selected is suitable if descriptive statistics are to be used, in instances where rigorous analysis is required, e.g. multiple regression, analysis of covariance or log linear analysis, a sample size of between 200 and 500 is recommended (Israel, 2009). Where samples involve comparisons between groups and sub-groups, a minimum of 100 elements may be needed for each major group or sub-group whilst for each sub-group, 30 to 50 may be required (Sudman, 1976). In the case of normal distributions, 30 to 200 elements will suffice but skewed distributions will result in significant departures from normality even for small samples and will require larger samples or a census (Kish, 1965).

5.2.10.2 Sample size adjustment

Sample size formulae provide the number of responses required to be obtained from a survey. It is suggested that in deciding the number of mailed questionnaires or proposed interviews, 10% should be added to the computed sample size to allow for those whom the researcher is unable to contact and 30% added to compensate for non-responses. This significantly raises the sample size than the number required for a desired level of confidence and precision (Israel, 2009).

5.2.11 Data analysis

Bou-Llusar et al (2003) explored the extent to which enablers explained results in the EFQM excellence model. The study is based on the EFQM (2010) model with five (5) enablers (predictor variables) and four (4) results (criteria variables). The enablers are: leadership, people management, policy and strategy, partnerships and resources and processes whilst the Results criteria consist of ***people results, customer results, impact on society and key performance results.*** The study used the stratified sampling method to select a random sample from existing data and used the canonical correlation analysis method to demonstrate the level of correlation between the enabler criteria and results criteria. The objective of the study was to find a linear combination of the predictor variables (enablers) that is maximally correlated with a linear combination of the results criteria. The Bou-Llusar et al. (2003) study found a strong causal relationship between enablers and results in the EFQM Model.

Salaheldin (2008) used an extensive review of past research and related literature to identify a list of twenty four (24) CSFs seeking to establish a link between the CSFs on one hand with operational performance and overall organisational performance respectively on the other. Salaheldin (2008) grouped the CSFs into three (3) categories: strategic factors, tactical factors and operational factors and used a conceptual model to explore the effect of the categories of TQM practices (CSFs) on performance. Salaheldin (2008) formulated a set of 9 hypotheses, representing the expected relationship between the CSF categories and the operational and organisational measures respectively. A questionnaire survey was used to collect data about the CSFs and the performance measures. Confirmatory factor analysis was used to empirically demonstrate a significant relationship between CSFs and both operational and organisational performance. This was evaluated using goodness-of-fit analysis.

Laugen et al. (2005) uses ANOVA to determine the differences in the adoption of action programmes between the highest and lowest mean scores respectively. The scores are based on company performance using a Likert Scale. A regression model (regression analysis) is used to determine which action programmes have the most effect on manufacturing performance. Where several indicators or variables are involved, *scales* are efficient data reduction devices which can be used to summarise the respective indicators or variables in a single score. Composite measures may be used as a technique for combining several indicators into a single measure. This can be used in cases where variables have no clear single indicators. Composite measures may be used to arrange cases of a specified variable in different ordinal categories such as from very low to very high (Babbie, 2007). Examples of composite measures of variables are *indexes* and *scales* which are efficient devices for datareduction and data analysis and can be used to summarise several indicators into a single numerical score. Both of these are ordinal measures which can be used to rank-order the units of analysis in terms of specific variables. An *index* is a type of composite measure used to summarise and rank-order several specific observations constructed by accumulating scores assigned to individual attributes. A *scale* as a type of composite measure which comprises of several different items which have a logical or empirical structure among them and which is constructed by assigning scores to patterns of responses with a recognition that some items reflect a relatively stronger degree of the variable than others. *Scales* are generally superior to *indexes* since scales take into account the relative intensities with which different items reflect the variable being measured (Babbie, 2007).

5.2.12 Scale Construction

Babbie (2007) identified five (5) types of scales:

i. Bogardus Social Distance Scale

ii. Thurstone Scales iii. Semantic

Differential iv. Guttman Scales

v. Likert Scales

The *Borgadus Social Distance Scale* as a measurement technique which is used to determine the willingness of people to participate in social relations with other people to different extents of closeness. The *Thurstone scale* is a composite measure which is constructed in line with weights assigned by to specified indicators of some variables. *Semantic differential* is described as a questionnaire format in which respondents are asked to rate items in terms of two opposing adjectives and *Guttman scale* as a composite measure which is used to summarise different discrete observations. In the development of questionnaires, standardised response categories such as "*strongly disagree, disagree, agree* and *strongly agree"* have been used to determine the relative intensity of different items Likert scales were used in the development of simple indexes which assigned scores to the respective response categories. This latter approach integrated the respective strengths of *indexes* and *scales.* Each index was constructed by accumulating the scores assigned to individual attributes or variables whilst in the case of scales, scores were assigned to patterns of responses. The scales took into account the differences in intensity of different items reflecting the variables being measured and are thus said to be superior to indexes (Babbie, 2007).

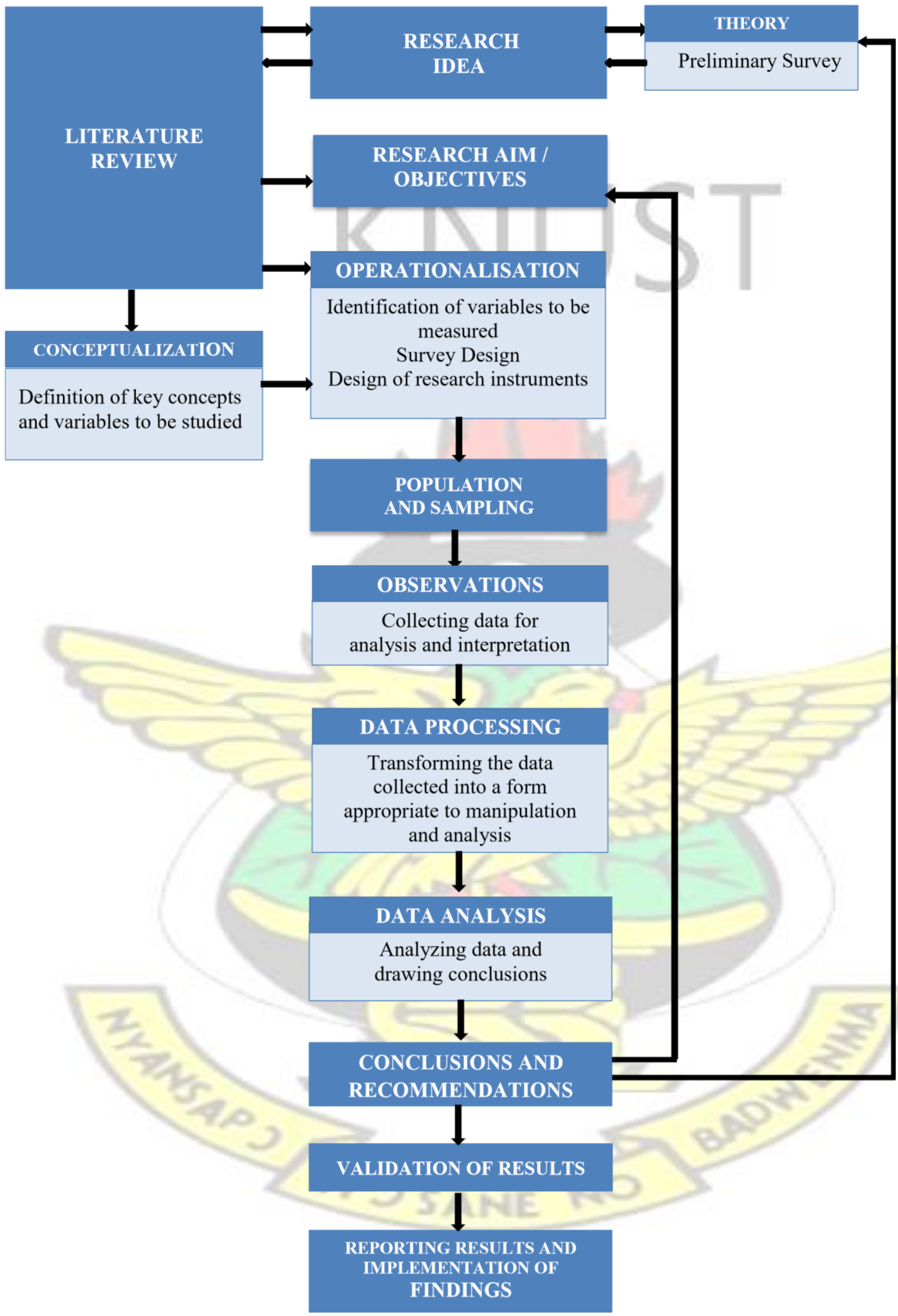
5.2.13 Validity

Babbie (2007) describes *Validity* as the extent to which an empirical measure correctly reflects the actual meaning of a concept which is being studied. It shows how far a scale accurately represents the concept of interest (Hair et al., 2006). Proving the ultimate validity of a measure may be difficult so different measures can be used to establish relative validity. These are: *face validity, criterion validity, content validity, construct validity*, *internal validation* and *external validation.*. *Criterion validity* is the extent to which a measure relates to some external criterion, *construct validity* as the degree to which a measure relates to other variables as is generally expected within a system of theoretical relationships. *Content validity* is the extent to which a measure covers a range of meanings which are covered by a concept. With *criterion validity,* validation is carried out using a set of selected criteria whilst *construct validity,* is based on the types of logical relationships amongst variables (Babbie, 2007). Generally, tests of *construct validity* are less compelling than those of *criterion validity*. *Internal invalidity* is described as the possibility that the conclusions from an experiment may not accurately reflect what went on in the experiment itself whilst *External Validity* is described as the possibility that the results and conclusions obtained from an experiment may not be suitable for making generalisations applicable to the real-world. The key outcomes of this study have been validated using *content validity*. *Content validity* is described by Babbie (2007) as a characteristic of a measure which makes it to appear to be a reasonable measure of a variable. It is also referred to in Hair et al. (2006) as face validity and described as a subjective assessment of the correspondence between individual items and the „concept through ratings by expert judges, pre-tests with multiple sub-populations or other means. *Content validity* does not necessarily imply that a measure is adequate but only suggests that a measure would seem to be valid from its appearance (Babbie, 2007).

5.3 METHODS USED FOR THIS STUDY

This section describes the specific research methods used to achieve the research objectives. Justification is provided for the methods selected. The research is based on the deductive approach in which theories of performance and excellence are developed based on examples reviewed from literature and the review of existing models. The study uses the idiographic causal reason approach to explore the practices employed by the best-in-class firms and their features Standards for the main concepts studied in this research such as KPIs and CSFs are established based on a study of trends amongst existing best-in-class performers. The study is based on an adaptation of the Babbie (2007) research design format (Fig. 5.1). The research design used for this study is shown in Fig. 5.3.

A preliminary survey was conducted to establish the general standard of performance of Ghanaian contractors. Results obtained from the preliminary survey were benchmarked against best-in-class contractors to demonstrate the need for improvement amongst Ghanaian contractors and standards of excellence in performance attainable for Ghanaian contractors.
The preliminary survey focused on D1D2 contractors, the largest contractors in Ghana. 25 D1D2 contractors were interviewed using structured questionnaires. The twenty five (25) selected were obtained from a list of contractors held by the regional AESL office. It was decided to conduct a census survey of all the 25 contractors. The survey explored the financial performance, productivity, predictability in time and cost as well as the workforce strengths of the respective companies. These were compared with corresponding data on top UK contractors and with industry-wide data on the UK construction industry. The preliminary survey showed significant gaps in performance between Ghanaian and UK contractors.



LITERATURE REVIEW
RESEARCH IDEA
THEORY
Preliminary Survey
RESEARCH AIM / OBJECTIVES
OPERATIONALISATION
Identification of variables to be measured
Survey Design
Design of research instruments
CONCEPTUALIZATION
Definition of key concepts and variables to be studied
POPULATION AND SAMPLING
OBSERVATIONS
Collecting data for analysis and interpretation
DATA PROCESSING
Transforming the data collected into a form appropriate to manipulation and analysis
DATA ANALYSIS
Analyzing data and drawing conclusions
CONCLUSIONS AND RECOMMENDATIONS
VALIDATION OF RESULTS
REPORTING RESULTS AND IMPLEMENTATION OF FINDINGS

Fig. 5.3 Research Design used for this study

5.3.1 Population and Sample size for Main Research

According to the Ministry of Works and Housing (MoWH) which keeps a register of all Ghanaian contractors in the respective classes, there were 139 D1K1 contractors in Kumasi and Accra at the end of 2010 and 380 D2K2 contractors in both Accra and Kumasi respectively. To reduce the level of variability, it was decided to use only D1K1contractors. This is because the characteristics of D1K1 contractors are distinct from those of D2K2 contractors and their responses are likely to be informed by different considerations. Thus the population size, N for D1K1 contractors is 139. Given that N is less than 200, the entire population was sampled using the census approach to sampling (Israel, 2009). In the absence of a central database of contractors and with much of the information at registration out-ofdate, it was impossible to identify all the contractors in the population. The preliminary survey and the comparisons with the UK contractors demonstrated the need for improvements in the performance of Ghanaian contractors. The main survey was designed to explore the factors which affect the performance of Ghanaian contractor and the factors which can lead to improved performances. The sample size was thus calculated mathematically to give a more precise sample for the research. According to Israel (2009), the level of risk that a sample selected will not show the true value of the population is reduced for confidence levels of 99% and increased for a lower confidence of 90% or lower.

Using a confidence level of 95%, the sample size, n was calculated as follows:

$$n = \frac{N}{1+N(e)^2}$$, Given N = 139 and e = 0.05 for confidence level of 95%

$n =$ 139 / 1+ (139) $(0.05)^2$

= 139 / 1.3475 = 103.153, approximated to 103

To compensate for non-responses and non-returns, an additional 30% was added to the *n* value calculated. i.e. 30% of 103 = 30.9 approximates to 31 questionnaires added for nonresponses. Adding 31 to 103 gives 134, therefore a total of 134 questionnaires were distributed of which 79 were returned.

For the sample size of 103, this constitutes a return of 76.699

i.e. approximately 77% returns of the questionnaires.

5.3.2 Design and specific methods for achieving the respective research objectives This section outlines the respective research objectives and the research methods used to achieve them. The study is based on an adaptation of the Babbie (2007) research design format (Fig. 5.1). The objectives are outlined below with the approaches used to achieve these.

1. **To establish the factors affecting the performance of Ghanaian contractors and evaluate the need for improvements in the delivery of projects and the overall performance of Ghanaian contractors**

A preliminary survey of selected Ghanaian D1K1 contractors was conducted to measure their performance using selected performance measures – productivity, employee numbers and pre-tax profits. The performance of the Ghanaian contractors was compared with the performance of the top UK contractors. The preliminary survey showed significant differences between the levels of performance of the UK and Ghanaian contractors respectively and demonstrated a clear need for improvements in the performance of Ghanaian contractors.

Following the preliminary research, a detailed literature review of relevant literature was undertaken. This covered an exploration of past research and academic publications relating to the Ghanaian construction industry. The review of existing literature helped to identify the key issues relating to the performance of Ghanaian contractors. The key findings arising from the review were used to develop structured questionnaires for a field survey. The use of fully structured questionnaires provided a range of structured and standardised responses for easy analysis. Two different types of questionnaires were used for contractors and financial organisations respectively. Interviews with contractors were limited to those in the D1K1 category. Contractors were selected using simple random sampling. In the case of the financial sector, all banks with universal banking licences were included in the sample. The questionnaire-based survey of financial institutions was used to explore issues relating to financing of construction projects and construction firms. The factors identified from the field survey as affecting the performance of Ghanaian contractors were analysed and reduced using factor analysis. The final factors identified from the Factor Analysis were tested using confirmatory interviews with experts drawn from the Ghanaian construction industry.

2. **To develop a cost-effective benchmarking framework for Ghanaian contractors to benchmark their performance against the best-in-class.**

In developing a benchmarking framework for Ghanaian contractors, existing frameworks, models and programmes for improving business performance were reviewed. The models and frameworks reviewed were compared to identify the strengths and weaknesses of these frameworks. Key features drawn from the models reviewed were adapted to develop a conceptual benchmarking framework and an implementation model taking into account the uniqueness of the construction industry and its project structures. The conceptual framework and implementation model were subjected to peer review at an International Construction

Conference and to review by selected contractors and leaders of contractor associations in Ghana. The benchmarking framework and implementation model were reviewed to take into account the views and comments from the conference and those from the contractors who tested the developed framework and implementation model. The finalised framework and implementation model were tested using validation interviews with selected experts from the Ghanaian construction industry. Further refinements were made to the framework and the model to incorporate the feedback received from the validation interviews.

3. **To identify the critical success factors (CSFs) for enabling world-class performance in Ghanaian contractors.**

Following a systematic review of primary and secondary literature on *performance* and *performance improvement*, the most important factors / critical success factors responsible for excellence in organisations were identified. Previous research, literature on existing programmes, models and frameworks commonly used for improving performance were reviewed. The review was extended beyond the construction industry to include a multisector review of best practice across a broad range of disciplines. The review highlighted the most important / critical success factors commonly used by researchers and authors. To identify the most important success factors, the respective factors identified in the various models, frameworks and programmes for improving performance were scored and ranked. The scoring and ranking method used showed the most commonly used success factors associated with improving business performance. The significant practices considered were those appearing at least five (5) times in the literature reviewed. Sixteen (16) practices / factors were considered significant to be included. Questionnaires were developed using these sixteen (16) most common CSFs from the ranking and scoring exercise. The questionnaires were used for a field survey of D1K1 contractors to explore their perceptions of the most important CSFs relative to the Ghanaian Construction industry. Following the questionnaire-based survey, factor analysis was used as a data reduction tool to analyse the CSFs identified from the literature study. The most important success factors relative to the Ghanaian construction industry were extracted. Confirmatory interviews were held with experts in the Ghanaian construction industry including academics, consultants and top contractors to validate the findings. In the case of the contractors involved in the validation process, they were selected from a hold-out sample which had not been involved in the original survey. The CSFs developed in this study have been integrated into the Benchmarking Framework developed for Ghanaian contractors.

4. **To establish a set of key performance indicators for enabling world-class performance amongst Ghanaian construction firms.**

A set of KPIs was developed from a review of KPIs from literature, KPIs from leading industries as well as KPIs and key performance measures (KPMs) used in national and international Quality Awards. Also, the metrics and measures used in benchmarking frameworks and those used in different sectors of the construction industry were reviewed and compared. A set of 10 performance measures and indicators relevant to excellence in the Construction Industry was developed for Ghanaian construction firms. The KPIs identified in the literature study were operationalised in the questionnaires used with contractors to identify those most relevant to the Ghanaian construction industry. Using factor analysis, the most popular KPIs were identified and validated using expert interviews. The KPIs developed in this study have been integrated into the Benchmarking Framework developed for Ghanaian contractors.

5. To develop a system that enables client groups to independently assess the capacity and performance of construction firms.

This objective was achieved through a review of literature and content analysis of existing academic publications. Literature on existing systems and databases used to rank performance were reviewed. The Fortune 500 list of companies, FT 500 list of companies, the Forbes 2000 list, The Construction News list of Top 100 UK Contractors, the Engineering News Record of top global contractors, the EFQM and MBNQA were reviewed. Also reviewed were UK Constructing Excellence‟s performance measurement framework for the UK construction industry and the system used by the Danish Construction Industry to assess contractor performance. The respective methods reviewed were compared to identify the commonalities, their respective weaknesses and strengths. Taking cognisance of the peculiar characteristics of the construction industry, the system most suited to the construction industry was selected and adapted to the Ghanaian construction industry. Using the KPIs previously developed for the Ghanaian construction industry, a Scorecard was developed which can be used to record the performance of Ghanaian contractors over a specified period. This is a template which can be used as a tool to record the performance in predetermined performance areas. It can be used to draw comparisons between the performances of identified contractors. Two variants of the performance measurement tool were developed. These are the Contractor Scorecard, ***ConScor*** and the Project Score Sheet, ***ProScor***, for assessing organisational and project performance respectively for contractors. Using this performance measuring tool, performance can be measured using a set of predetermined criteria. The tools developed – ***ConScor*** and ***ProScor*** – were validated using focus group sessions of contractor groups. Using the scorecard, the performance of Ghanaian real estate construction firms from the Ghana Real Estate Developers

Association (GREDA) and the Association of Building and Civil Engineering Contractors, Ghana (ABCECG) were

measured and scored for each of the KPIs developed in this study for their last three projects.

CHAPTER SIX

RESULTS AND ANALYSIS OF RESEARCH FINDINGS

6.1 INTRODUCTION

This chapter presents the results of this study and the analysis of the results. The results include the main findings of the literature study and the empirical data obtained from the field survey of Ghanaian contractors and banks. The data is analysed using statistical methods and SPSS software. This chapter also presents the interpretation of the results and key findings of this study relative to the key research questions.

6.2 UK AND GHANAIAN CONTRACTOR PERFORMANCE COMPARED

In this section, the performance of the top contractors selected from the UK is compared with contractors in Ghana. Table 6.1 shows the results of preliminary survey for participating Ghanaian contractors in areas of turnover, pre-tax profits and employee numbers. These measures give an indication of the overall contractor business performance. Only 12 of the participating contractors were willing to provide details of their financial performance due in many cases to the reluctance of some contractors to giving out details of their earnings. Some contractors expressed the worry that they could be targeted by tax authorities for higher taxes if they declared their real earnings. Others were concerned about their earnings being in the public domain and thus declined to answer questions on their earnings. Unlike in the UK where company annual reports, contractor performance league tables and other relevant company data are freely available, this is not the case in Ghana where such information where available tends to be a matter of internal record owing to mainly social and economic reasons as outlined. Table 6.2 shows the turnover, pre-tax profits and employee numbers for leading contractors from the UK top 100 for 2008. Comparison of productivity data between the Ghanaian contractors surveyed and the top UK for productivity is shown in table 6.3. The UK average of £45,000 of productivity for contractors in 2008 (table 6.6) underlines the gap in performance between UK and Ghanaian contractors.

Table 6.1 Business performance of Ghanaian contractors from preliminary survey

Results of Preliminary Survey of Ghanaian Contractor Performance			
D_1D_2 Contractors	**Turnover(£m)**	**Pre-tax profits (£m)**	**No. of employees**
Contractor 1	15	1.8	64
Contractor 2	15	2.25	50
Contractor 3	1	0.1	40
Contractor 4	0.43	0.043	43
Contractor 5	0.5	0.075	80
Contractor 6	0.139	0.017	50
Contractor 7	0.139	0.017	50
Contractor 8	0.1	0.015	30
Contractor 9	0.076	0.008	43
Contractor 10	0.025	0.01	35
Contractor 11	0.015	0.003	28
Contractor 12	0.01	0.004	30

Table 6.2 Business performance of leading UK Contractors in selected performance measures

Leading Contractors in the UK Top 100 Contractors (2008)			
Contractor	**Turnover(£m)**	**Pre-tax Profit (£m)**	**No. of Employees**
Balfour Beatty	6,466	201	34,779
Carillion	3,330.7	94.4	30,746
Laing O‟Rourke	3,322.1	81.2	22,567

Morgan Sindall	2,114.6	57.6	7,228
Kier	2,065.4	77.6	9,425
Sir Robert McAlpine	1,816.9	45.9	2,834
Interserve	1,738	69.3	26,809
HBG/Nuttall	1,637.8	67.9	5,539
Galliford Try	1,409.7	60.2	3,885
Mitie	1,407.2	67.9	47,959
Bovis Lend Lease	1,184.9	11.5	1,875
Vinci	1,099	44.3	5335

Source: www.building.co.uk; accessed: 10/09/2008

Table 6.3 Comparison of top UK and Ghanaian Contractors in productivity compared

Top UK Contractor Productivity (£)	Ghanaian Contractor Productivity (£)
302,000	22.71
176,000	19.42
152,000	14.50
142,000	10.60
110,000	7.49
93,000	7.03
86,000	6.93
83,000	3.42
75,000	1.94
63,000	1.50
62,000	1.43
61,000	1.20

Table 6.4 Construction Cost Predictability for Ghanaian Contractors

Project No.	Tendered Sum (cedis)	Final Cost (cedis)	Excess Cost (cedis)	Percentage change (%)
1	552,029.13	574,192.10	22,162.97	4.10
2	826,495	1,007,018.01	180,523	21.84
3	4,180,524.15	4,920,000.00	739,475.90	17.69

4	242,220.00	250,720.18	8,500.18	3.51
5	433,247.20	473,501.00	40,253.80	9.29
6	115,578.04	112,128.90	-3,449.14	-2.98
7	801,326.63	1,047, 174.43	245,847.80	30.68
8	754,756.64	878,655.64	123,899	16.42
9	689,484.64	724,746.31	35,261.67	5.11
10	160,798.12	166,208.00	5,409.88	3.36
11	337,526.65	396,000.00	58,473.35	17.32
12	796,495.83	899,938.09	103,442.26	12.99
13	954,400.00	1,056,238.33	101,838.30	10.67
14	131,502.24	154,539.56	23,037.20	17.52
15	3,316,092.81	4,312,693.45	996,600.60	30.05
16	3,000,000.00	4,500,000.00	1,500,000	50.00
17	2,700,000.00	4,000,000.00	1,300,000	48.15
18	826,495.84	930,129.04	103,633.20	12.54
19	710,312.04	785,824.64	75,512.60	10.63
20	954,499.34	1,057,095.82	102,596.50	10.75
21	1,843,096.92	3,484,126.59	1,641,029.60	89.04
22	1,101,824.05	1,397,642.59	-110,182.40	-10.00
23	13,579,000.00	13,959,274.00	380,274	2.80
24	420,144.20	440,276.62	20,132.42	4.79

Table 6.5 Construction Time Predictability for Ghanaian contractors

Contractor	Contract Period (Months)	Completion Time Actual (Months)	Period of Delay (Months)	Percentage Delay (%)
1	24	48	24	100.00
2	12	13	1	8.33

3	21	21	0	0.00
4	10	10	0	0.00
5	12	30	18	150.00
6	10	12	2	20.00
7	18	41	23	127.78
8	4	4	0	0.00
9	12	14	2	16.67
10	14	18	4	28.57
11	12	12.75	0.75	6.25
12	12	14	2	16.67
13	24	36	12	50.00
14	10	10	0	0.00
15	9	12	3	33.33
16	15	20	5	33.33
17	9	11	2	22.22
18	5	7	2	40.00
19	13	21	8	61.54
20	17	26	9	52.94

From table 6.4, only two projects considered in the preliminary survey were completed on budget or under budget. Out of a total of 24 projects, this means an average cost predictability of 8.33 % for the Ghanaian contractors surveyed compared to the UK average for the same period of 49% (table 6.6).

On Time Predictability, 20% of the projects surveyed were completed on time as compared with the UK average of 45% projects completed on time or before the scheduled time. None of the projects surveyed in the preliminary survey was completed ahead of schedule. This analysis demonstrates the need for improvement in performance among Ghanaian contractors.

Table 6.6 UK Construction Industry performance Summary – Source (Constructing Excellence, 2009)

Measure	**2009**	**2008**
Client Satisfaction - Service (8 out of 10 or better)	84%	83%
Client Satisfaction – Product (8 out of 10 or better)	86%	83%
Defects - (8 out of 10 or better)	77%	73%
Client Satisfaction - (8 out of 10 or better)	82%	75%
Cost Predictability – Project (% on or under cost)	48%	49%
Time Predictability – Project (Percentage on time or early)	45%	45%
Profitability (Median profit on turnover)	9.9%	9.6%
Productivity (Median Value added per employee in	£46,2000	£45,500
Safety (Reportable accidents per 100,000 employed)	906	865
Safety (Percentage of companies achieving zero AIR in a year – all companies)		

6.3 Field Survey of Ghanaian Contractors

The field survey of Ghanaian contractors focused on D1K1 and D2K2 drawn from across Ghana. Participants were selected randomly from lists provided by the Ministry of Works and Housing (MWH) and the Association of Building and Civil Engineering Contractors of Ghana (ABCECG). To reduce variability in the answers provided by respondents, answer options based on the literature study were provided in the research instrument used – a structured questionnaire. The survey instrument was used to further explore the key issues arising from the literature review of the Ghanaian construction industry to develop a deeper understanding of the issues. Leading Ghanaian contractors and financial institutions were surveyed using the structured questionnaires. In the next section, the results and key findings of the survey of Ghanaian contractors and financial institutions are presented, analysed and discussed. Of the 134 questionnaires sent out, the 79 returned represented 77% returns which represent a very good returns rate (Babbie, 2007) possibly due to the high interest shown by respondent contractors both in the subject of the research and in the future findings.

6.3.1 Profiles of respondent contractor firms

The relative sizes of the Ghanaian contractors interviewed were determined based on their employee numbers. In terms of their employee numbers, the majority of respondent companies (57.5%) employed between 10 and 50 employees with only one of the 79 respondent companies employing more than 500 people (Fig. 6.1). This is a good representation of the profile of Ghanaian construction firms most of which have small operations.

The companies sampled showed a wide variation in the educational backgrounds of the employees with just about six of the respondent companies having employees who have a university level qualification. Whilst this does not necessarily reflect performance levels, the lack of university level graduates could impact management and administration in Ghanaian construction firms.

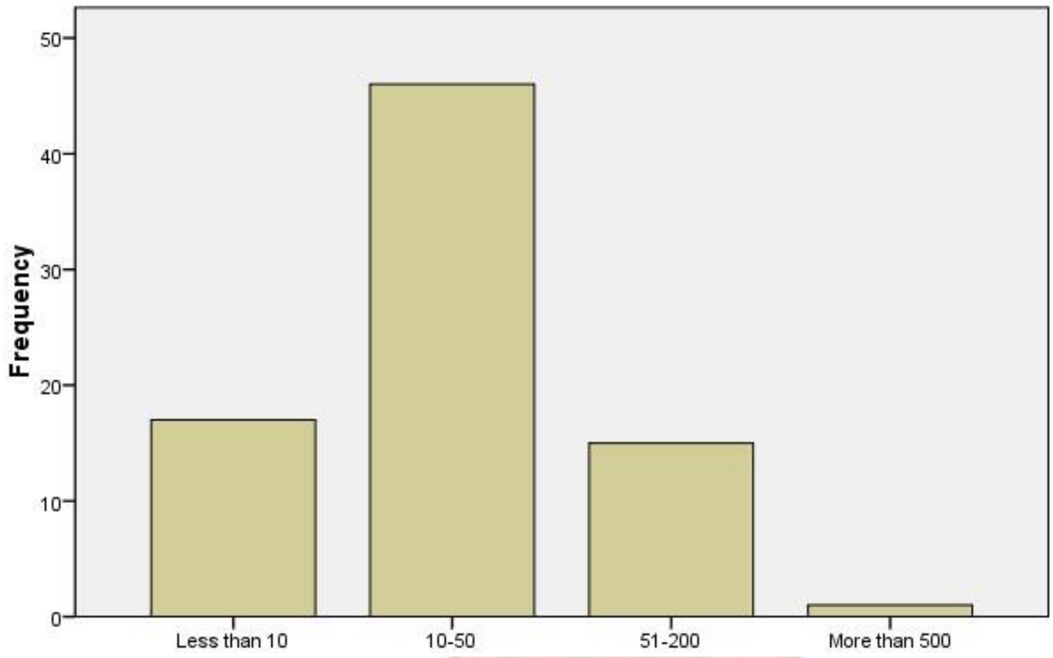


Fig. 6.1 Employee numbers in Ghana contractors

Of the valid responses, 53.3% described themselves as "local companies". Most Ghanaian construction firms operate within small geographical areas unlike UK construction firms which mostly have nationwide coverage with a significant number operating internationally. Some of the top UK contractors such as Vinci and Skanska are local representatives of multinational construction firms with some of the larger contractors such as Balfour Beatty and Taylor Wimpey as major players at the global level. In Ghana, apart from a small number of foreign owned companies, contractors mainly operate within a particular town or city. 22.7 % of those surveyed described themselves as regional companies with 18.7% described themselves as the local representatives of a regional company and only 4% described as the local or regional arm of a national construction company (Fig.6.2).

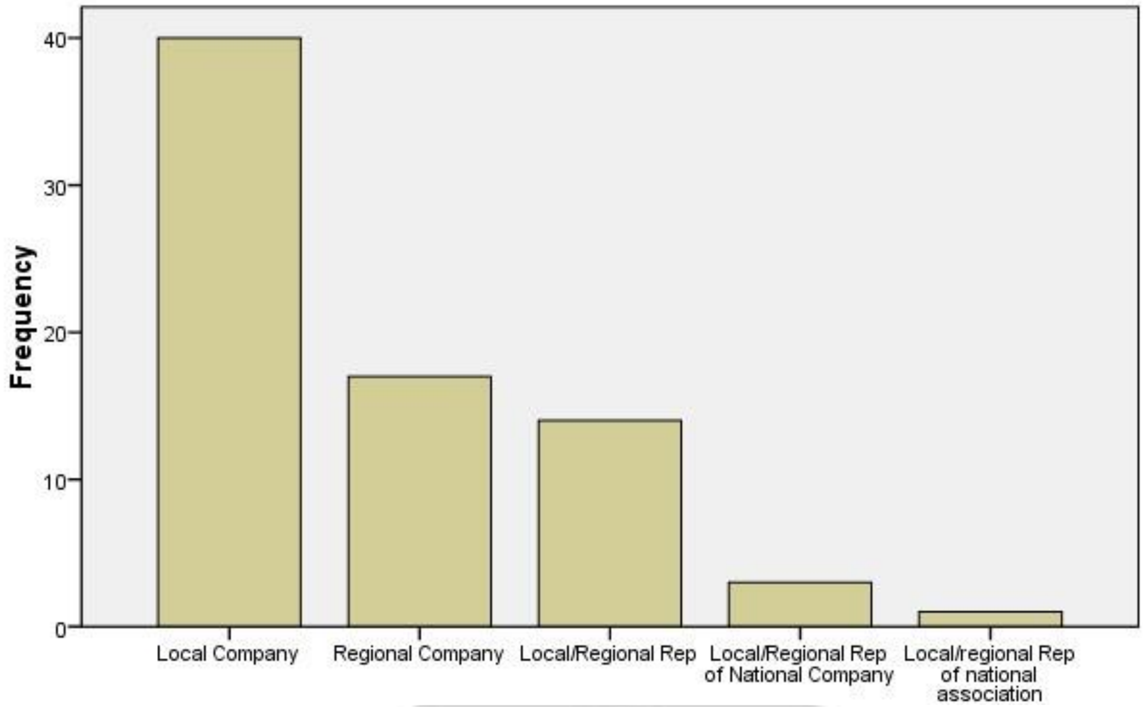


Fig.6.2 Company types surveyed

6.3.2 Procurement of Public Projects

The study showed that procurement of projects amongst the companies surveyed was mainly from government sources with 45% of all contractors surveyed exclusively dependent on government projects for their last three projects. A further 32.6% were partly dependent on public sources for projects. The review of the last three projects revealed only 22.5% of the contactors surveyed had no recourse to public sources for projects (Fig.6.3). This trend exposes a large number of Ghanaian contractors to problems associated public sector contracts such as payment delays and the effects of perceived widespread corruption within the construction industry.

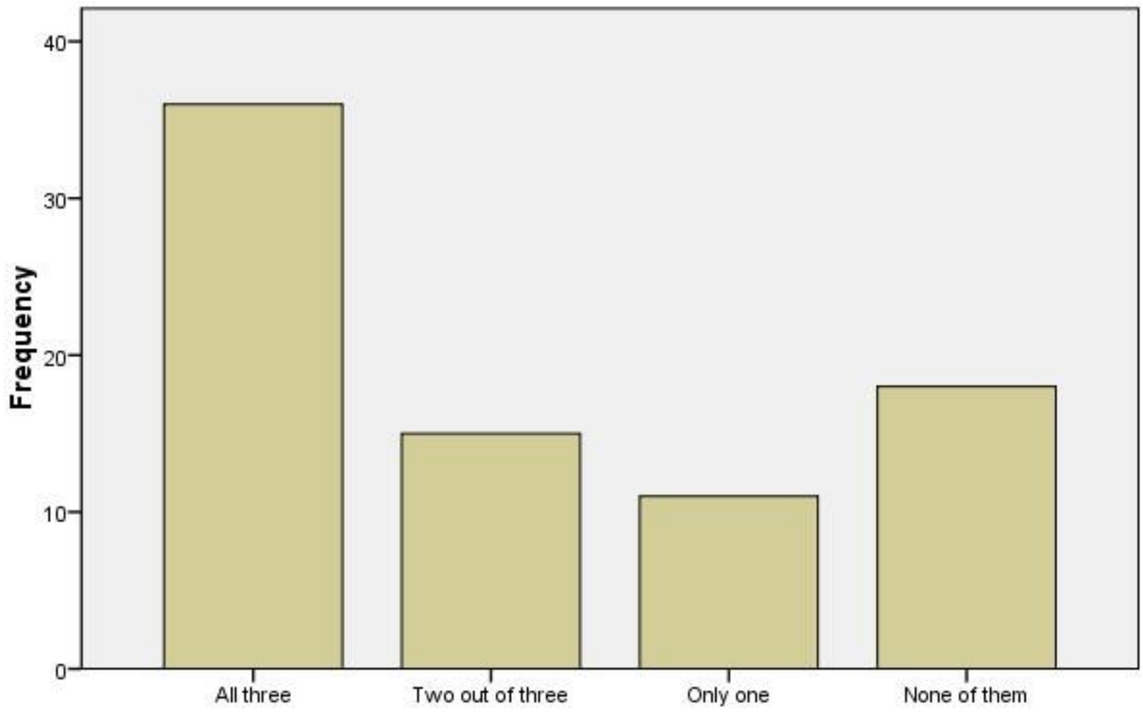


Fig.6.3 Proportion of contractors and projects sourced from government for last three projects

With regards to contractor-initiated speculative projects such as real estate developments, there is a balance between contractors involved in speculative projects and those with no interest with 44% respectively interested in the two options. There is however some scope for increasing contractor participation in speculative projects in the number who have no interest in contractor-initiated projects including those only interested government projects (12%) and 5.5% who did not provide valid responses (Fig.6.4).

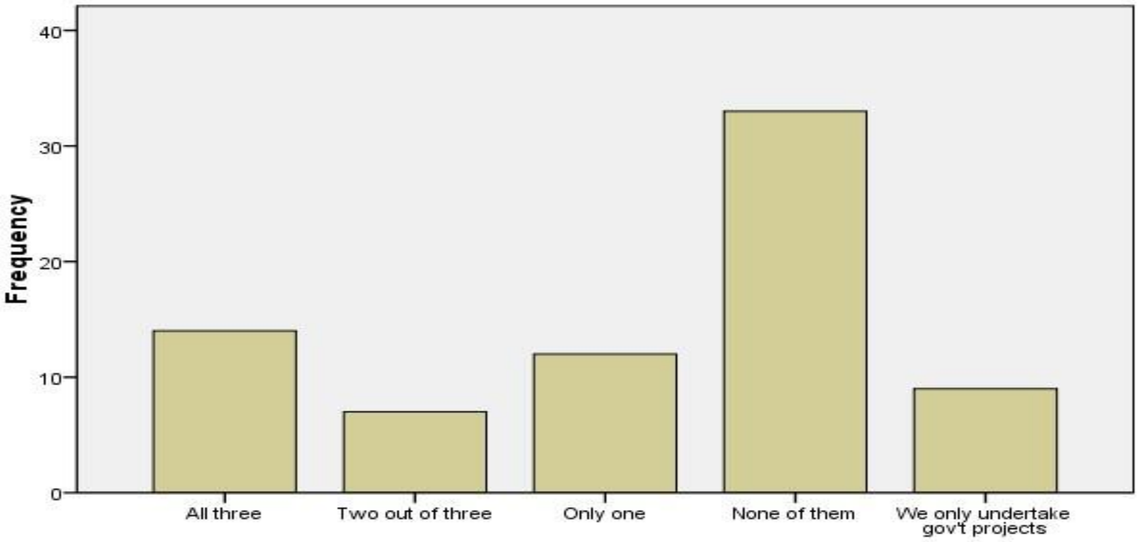


Fig 6.4 Proportion of projects from last three which were speculative

6.3.3 Real estate development by Ghanaian contractors

The study assesses the interest amongst Ghanaian contractors in real estate developments. The question sought to establish the number of contractors actively involved in the real estate sector. 80% of the contractors surveyed who gave a valid response had not undertaken any real estate developments in the past year. As presented in fig.6.5, a single contractor each was recorded to have undertaken 10 to 24 and 25 to 50 houses respectively whilst 13 out of the 74 who responded had completed between 1 and 9 houses. Against the backdrop of a high housing deficit (estimated to be around 1.5million houses), the survey shows opportunities within the real estate sector for Ghanaian contractors to expand their operations. As the study showed, some 80% of contractors who answered the question on whether or not they were involved in real estate construction were not involved in the development of residential property for sale.

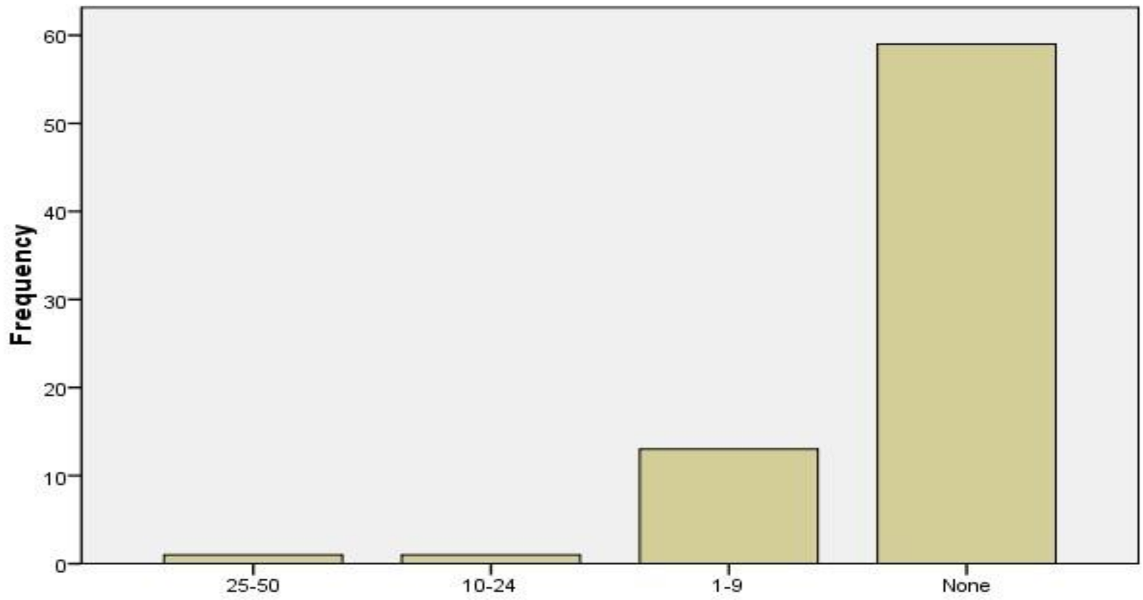


Fig.6.5 Number of real estate houses completed by contractors surveyed in 2010

6.3.3.1 Sales patterns for real estate developments in Ghana

The survey explores sales patterns for real estate developments. Contractors were asked when most sales were made – before construction or post-completion. Amongst the valid responses provided, there is no dominant sales pattern with as many as 39% of contractors selling out completely before construction. 22% of contractors who responded started construction only after receiving a confirmed order (fig.6.6). Compared with countries such as the UK with developed housing markets, it is evident that opportunities exist for contractor led speculative housing developments actively marketed in the pre-construction period in addition to completed property available for immediate occupancy. The survey shows only 17% of contractors surveyed sold completed real estate houses which were available for immediate occupancy as against 52% who took anytime from 1 month to 24 months from the time ordered to completion. A popular trend in the Ghanaian real estate sector is for contractors to finance real estate developments using stage payments made by prospective buyers. Of the respondent contractors, 30%confirmed the use of this approach to financing real estate construction. Whilst this approach limits the number of potential buyers who are able to afford the high upfront costs, it reduces the exposure and financial risks to the contractors. Apart from a desire to reduce contractor exposure to financing risks, this situation is largely influenced by the high interests charged on bank finance.

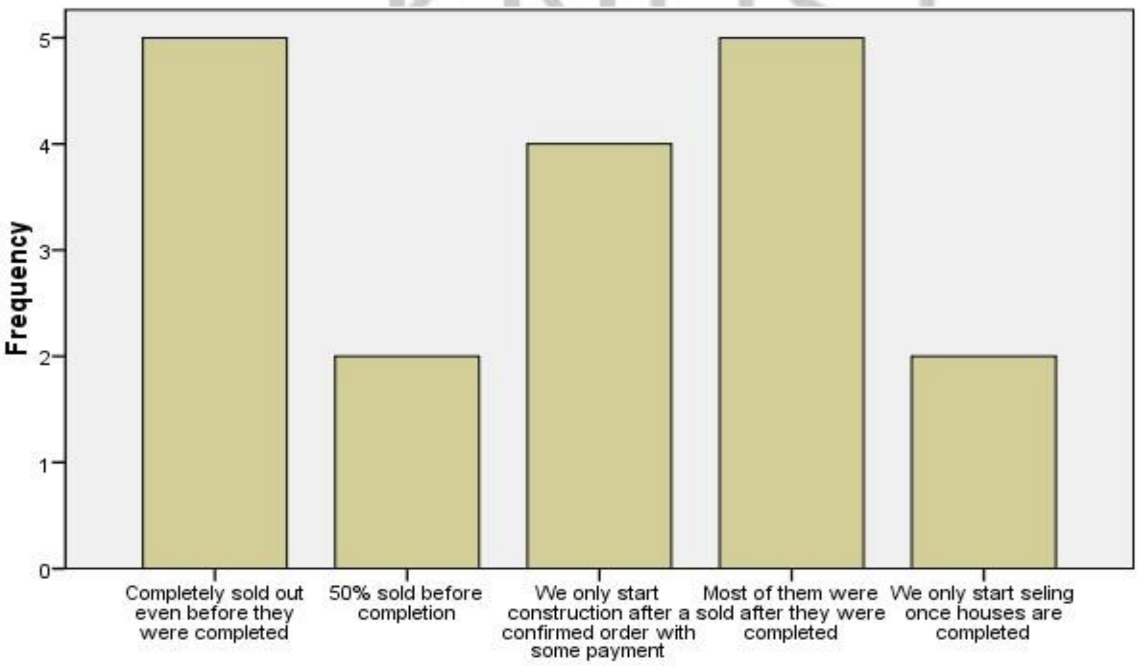


Fig 6.6 Distribution showing how last batch of property were sold by contractors

6.3.3.2 Marketing of real estate property

The survey explored the tools employed by the contractors to market real estate developments. Of the valid responses, 9 contractors, representing 30% had property shops or outlets where prospective buyers could sample show houses or discuss financing options etc. (Fig.6.7). 70% of the valid responses represented contractors involved in real estate development did not use any such outlets to market their products. Whilst there is a rising trend of developers who have "show houses" open for visits by prospective buyers, the survey results showed potential opportunities to improve house sale volumes through increased awareness of availability as well as listening to and resolving potential buyer enquiries.

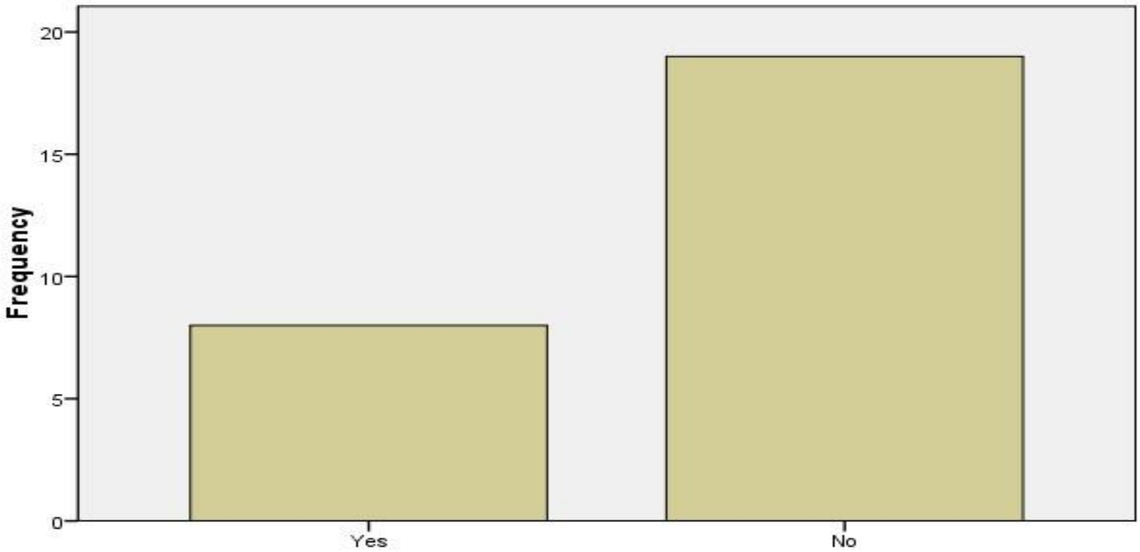


Fig. 6.7 Construction companies which have shops for customer viewing

6.3.3.3 Financing for real estate acquisition

Of significant importance to potential buyers is information about the availability of finance. The availability of finance is also relevant to construction firms since it directly influences the volume of sales of their products. Whilst traditionally banks and other financial institutions are the main sources of mortgage finance, the review of literature in this study showed that in the UK, some contractors are actively and in some cases directly involved in the provision of finance for potential buyers of residential property. Among the UK contractors some of those who do not, who do not directly provide mortgage finance, facilitate the mortgage application processes with banks on the buyers‟ behalf. The survey explored the number of Ghanaian contractors who offered finance facilities for buyers. 19% of the respondents offered financial facilities such as mortgages to potential buyers (fig.6.8).

21 out of 26 contractors involved in residential and real estate developments offer no financing facilities to prospective buyers. Given that 44% of buyers of residential property use 100% mortgage financing (fig.6.9), the active involvement of contractors in arranging finance for

potential buyers can yield increases in both the number of financing requests and the volume of approved finance applications leading to property sales.

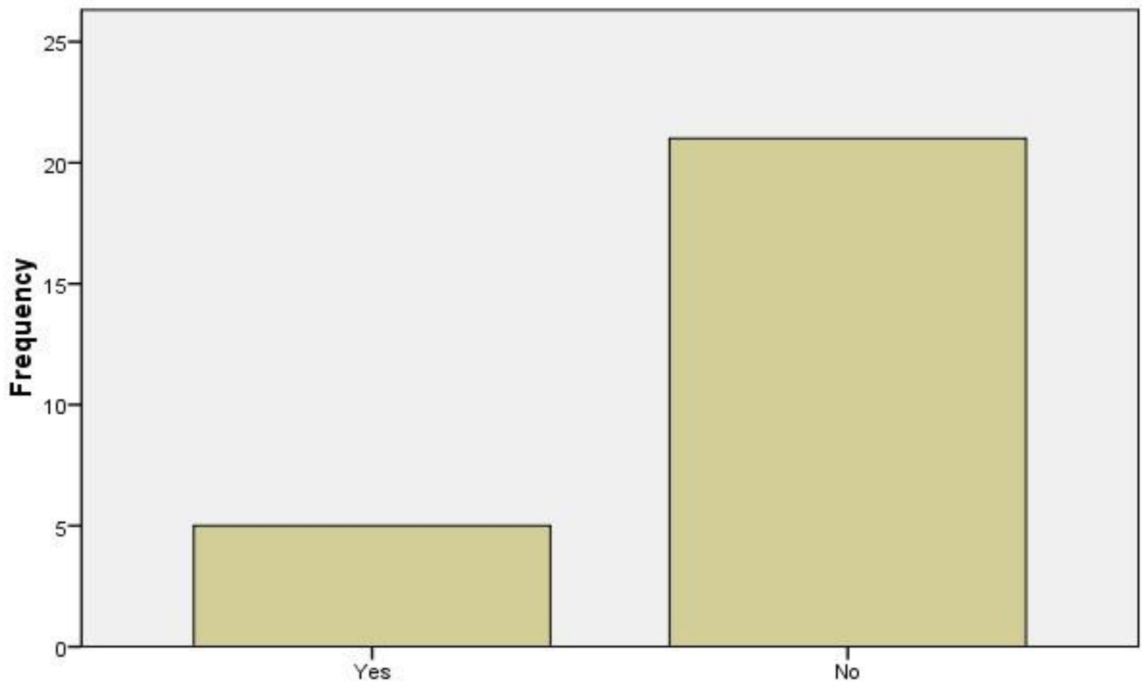


Fig 6.8 Construction companies which offer finance for house purchase

Given the income levels amongst Ghanaian workers relative to the cost of completed property, 100% mortgages will increase the number of Ghanaians able to afford their own property using mortgage finance. In this direction, contractors can play a very important role by facilitating the processes on behalf of buyers or by promoting bank products to potential buyers. Evidence from literature shows that in the UK, some of the leading contractors paid the deposits required by banks on behalf of buyers thus enabling buyers to buy using 100% mortgages.

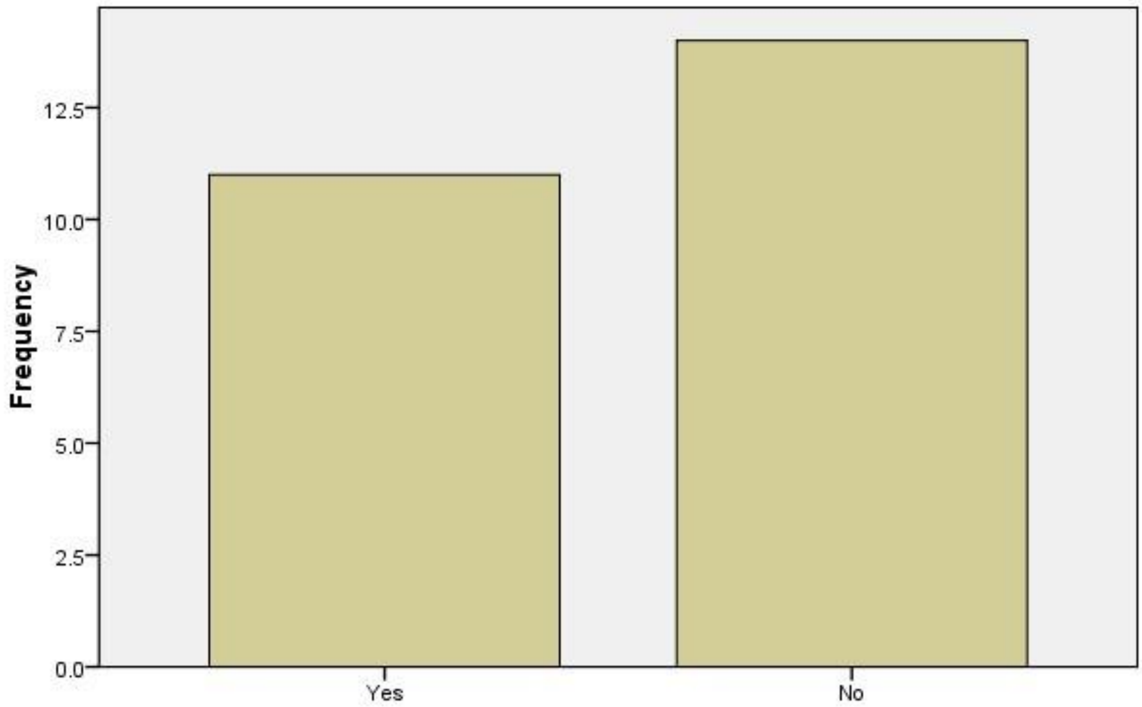


Fig 6.9 Companies whose customers are able to buy property with 100% mortgages

6.3.4 Financing for construction activity in Ghana

In addition to sources of financing for potential buyers, the main sources of financing for contractors are explored. The survey shows bank finance as the most popular with 24% of the contractors using bank finance to fund their operations. This trend is observed despite widespread perceptions amongst contractors of the difficulties associated with accessing bank finance. The reasons which affect contractor access to bank finance are explored in other sections of this report. Following bank finance closely are contractors who use their "own sources" representing 23% of the respondents. This option precludes most of the problems associated with the use of bank finance for construction projects and ensures contractors keep most of their profits which otherwise would be spent on interest payments.

The next most popular funding option used by contractors is the use of funds contributed by prospective buyers in the case of residential property and real estate development projects. In this option, prospective buyers are asked to pay the total cost of the property in an agreed number of instalments before the commencement of work, at lintel level and on completion of construction – before keys are handed over. Typically, the respective percentage payments are 40%, 40% with a final instalment of 20%. This option limits the risk to the use of contractor finance and makes the least demands on contractor cashflow. However it restricts opportunities for increasing the numbers who are able afford property since the instalments are high and prohibitive.

6.3.4.1 Use of bank finance for construction

The survey explored the frequency with which contractors resort to bank finance for their projects. Contractors were asked whether they used bank finance "always", "most of the time", "sometimes", "very rarely" or "never". 2.5% of the respondents indicated they always used bank finance whilst those who used bank finance "most of the time" represented 22.5% of the respondents. This shows that 25% of the respondents actively used bank finance for their operations as against 45% representing those who "only rarely" or "never" used bank finance as shown in fig. 5.10. The largest group of contractors comprising about 21% of the respondents used bank finance only "sometimes". Despite the growing number of banks and other financial institutions in Ghana, the survey shows an apparent lack of interest amongst Ghanaian contractors to borrow from banks to finance their operations. The reasons which account for this situation are explored and reported in other sections of this report.

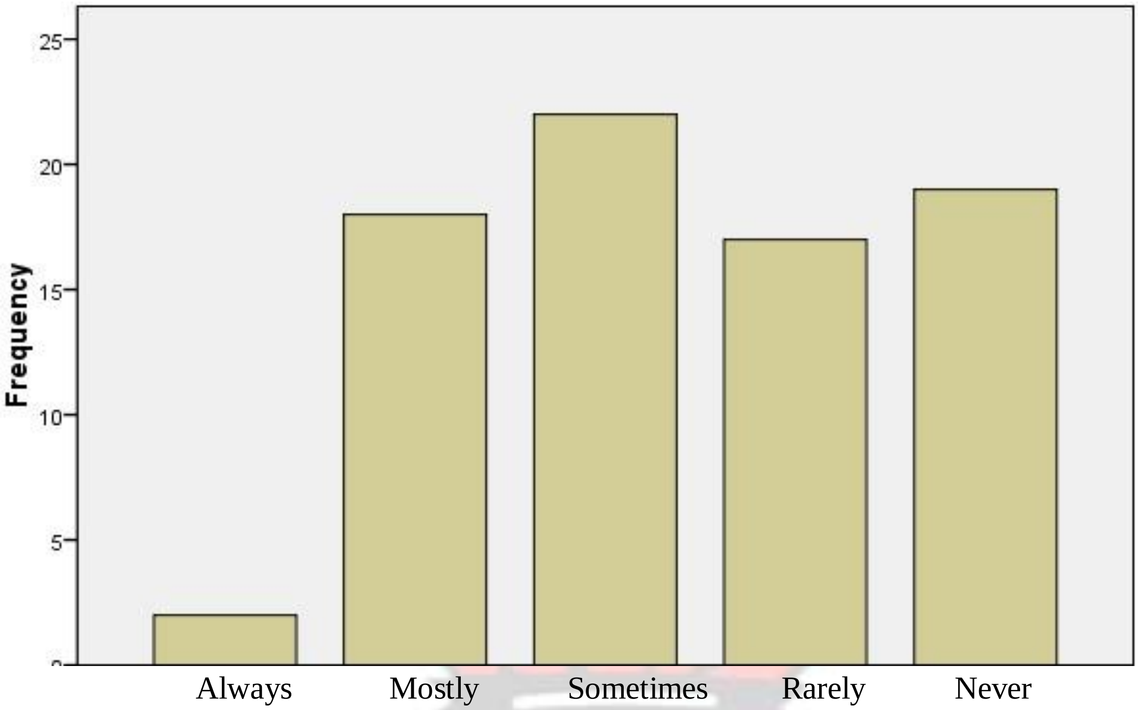


Fig 6.10 Distribution showing how often construction companies borrow from bank

The survey further seeks to establish the success rates amongst contractors in obtaining bank finance. 6.2% of respondents found the process of applying for and their success with banks easy. This section of the respondents always used bank finance for their operations. A further 16.2% of the respondents they were successful most of the time in accessing bank finance whilst 43% indicated that they were successful “sometimes” in accessing bank finance (fig. 6.11). This shows that cumulatively, 68.1% of the respondent contractors have a good measure of success with banks as against the nearly 29% who have had rather limited or no success with raising bank finance.

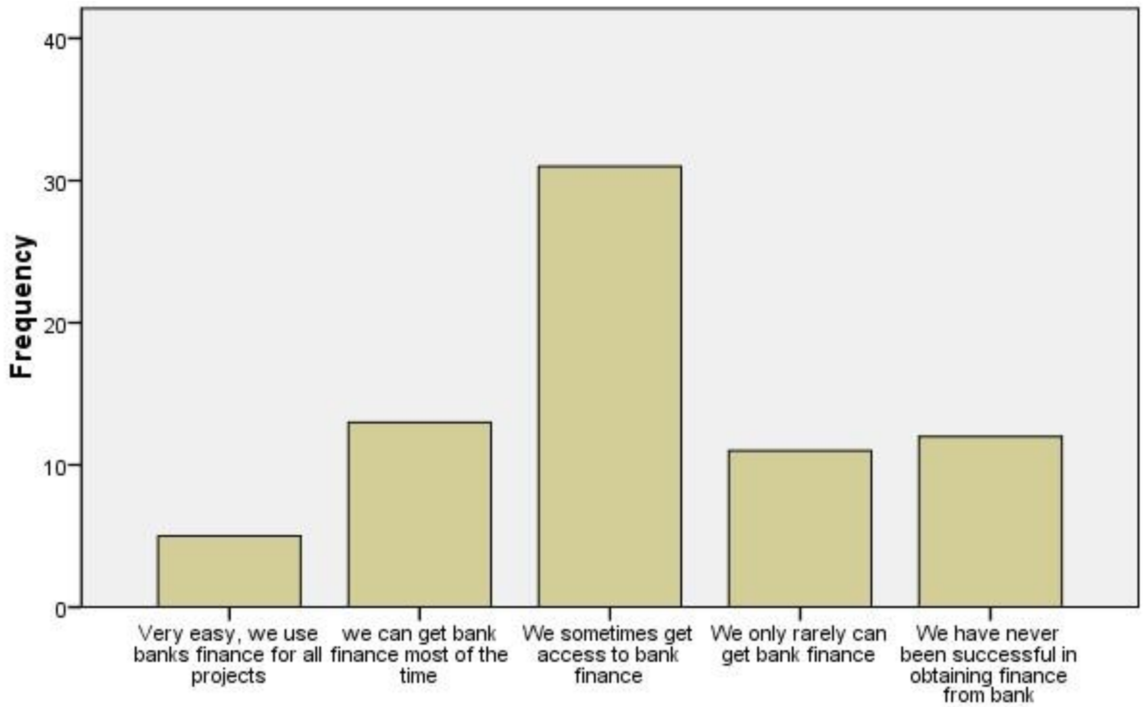


Fig 6.11 Relative ease with which contractors can access bank finance

6.3.5 Factors affecting contractor access to credit

The survey also sought to identify the main factors which affected Ghanaian contractors‟ ability to access credit. On a scale of 1 to 5, contractors were asked to choose from 7 factors perceived to influence the decision to grant or refuse contractor applications for credit. The responses were analysed using factor analysis and showed that the most significant factor which hinders Ghanaian contractors‟ ability to raise credit was the long delays associated with payments for government funded projects.

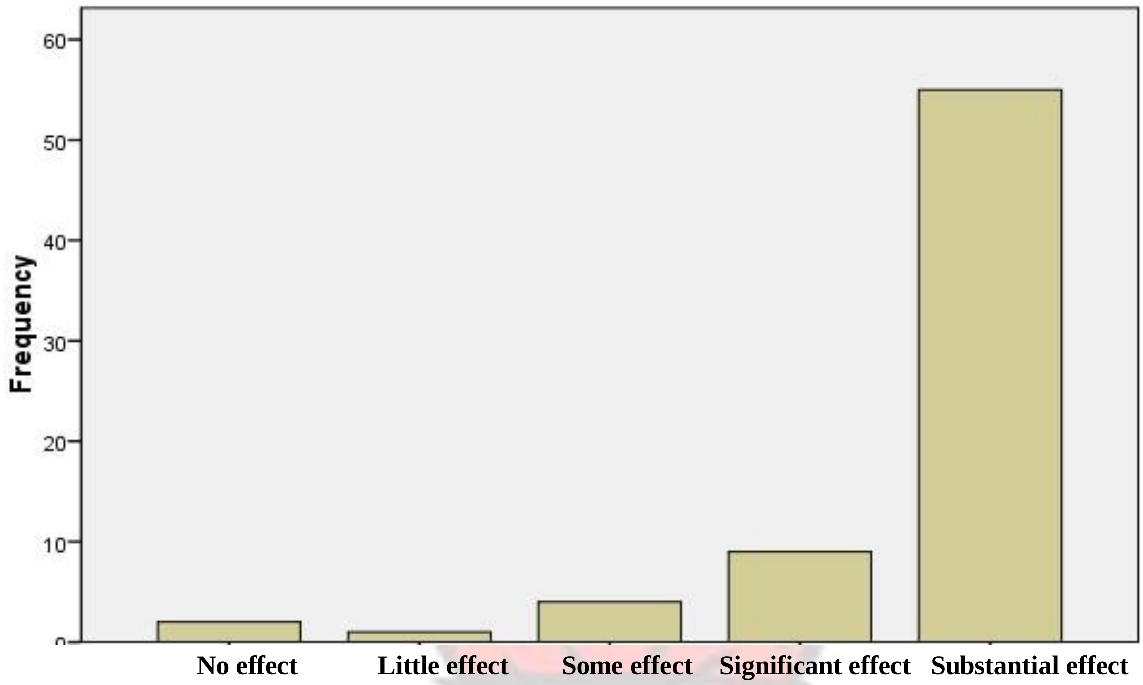
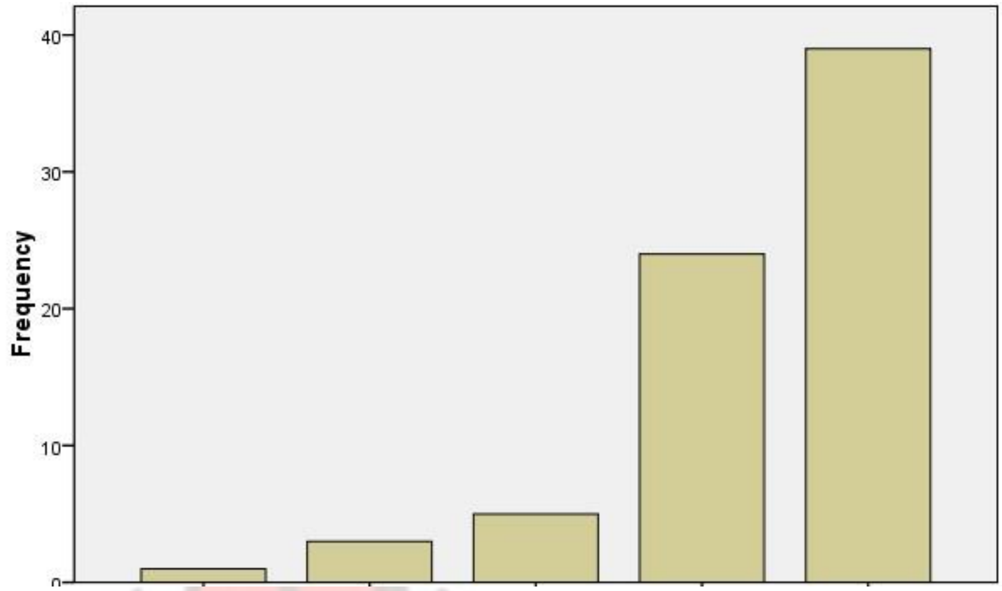


Fig 6.12 Effect of late government payments on contractor success with finance

Whilst not all Ghanaian contractors were exclusively engaged in government funded projects, government funded projects had the least chances of success in raising finance. Given the high dependence of Ghanaian contractors on government sources for projects – confirmed in this study – the overall effect on contractor ability to raise needed capital via banks is significant.

The next factor which is perceived to hinder access to credit by Ghanaian contractors is the high interest rates charged by Ghanaian banks. This is a major deterrent to contractors who may otherwise have been able to access and utilise bank credit. Fig. 6.13 shows the distribution of contractors‟ views of to what extent this affects them. A separate section of this report focuses on the current interest rate regime in Ghana and the effects on contractors.



No effect Little effect Some effect Significant effect Substantial effect

Fig 6.13 Number of contractors affected by high interest rates

Other causes such as the lack of collateral amongst Ghanaian contractors, defaults in payments amongst contractors, low profit margins within the industry and a lack of suitably qualified personnel to manage loan funded projects were not deemed to have a critical role in determining whether contractors were able to access credit or not.

6.3.6 Contractor perceptions of standards of completed projects

Contractor perceptions of the general standards of completed projects and the practices of within the Ghanaian construction industry are explored. It is significant that more than 53% of the contractors interviewed rate the general standards of completed projects and the practices within the Ghanaian construction industry as being only fair. Cumulatively, 78% of the respondents rated the standards of projects and the practices as being very poor to fair. Only 22% described project quality and practices within the industry as being good or excellent (fig. 6.14).

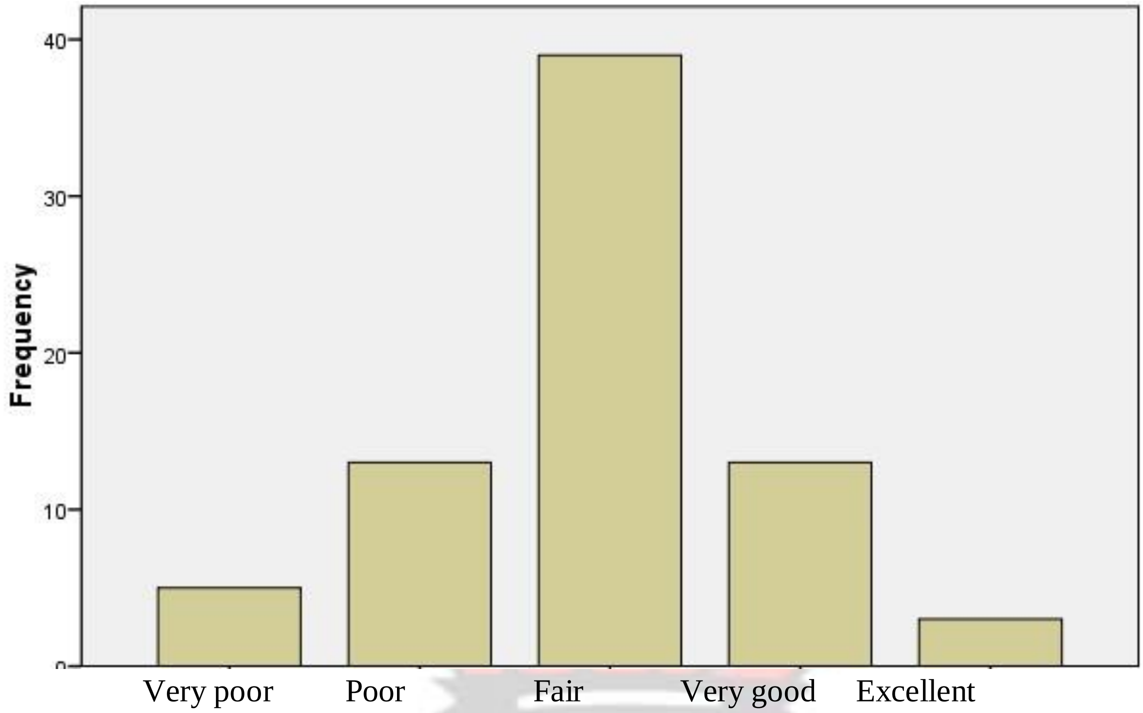


Fig 6.14 Contractor perceptions on standards of completed projects

6.3.7 Factors affecting contractor performance

The study explored the factors which contractors perceived to have an effect on the overall performance of Ghanaian construction companies. On a scale of 1 to 5, contractors were asked to rate 14 problems identified from literature as affecting the performance of Ghanaian contractors. On the Likert Scale used, 1 was assumed to mean “no effect on performance” whilst 5 represents “seriously affects performance”. It is assumed that both 4 and 5 on the scale represent factors which have a significant effect on contractor and project success.

6.3.7.1 Payment delays

From the study, the strongest factor which was deemed by the most respondent contractors as influencing contractor success was the delays relating to payments by the government or governmental agencies for completed projects, according to 88% of the respondents as illustrated in fig. 6.15.

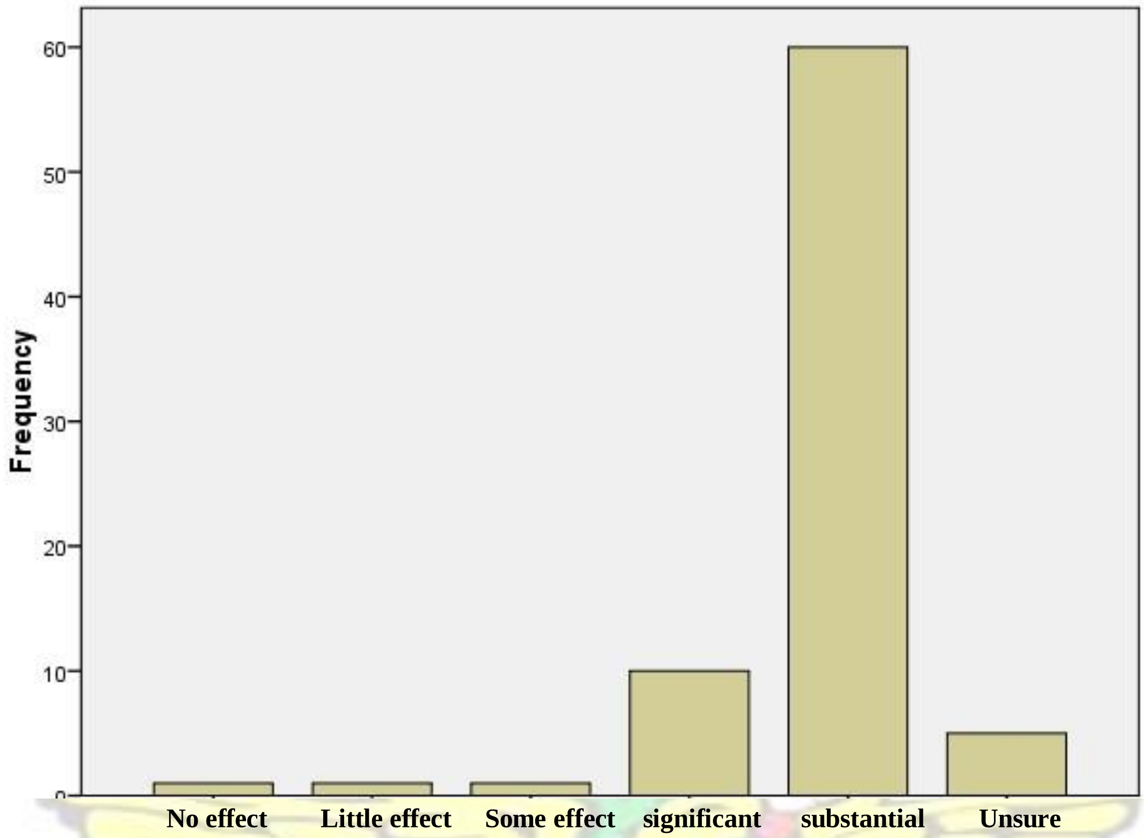


Fig 6.15 Effect of payment delays by government agencies on contractor performance

The effect of long delays in paying contractors is that where loans are contracted to construct projects, interest rates will increase significantly and thus affecting the overall profits of contractors which in many cases are small to start with. Also high inflationary trends devalue both the prime cost and the profits made by contractors where there are protracted delays in paying contractors.

6.3.7.2 Perception that contracts are awarded based on political affiliation

Another significant factor arising from this survey is the perception that most public contracts were awarded on the basis of political affiliation, a position supported by 83% of respondents as illustrated in fig.6.16.

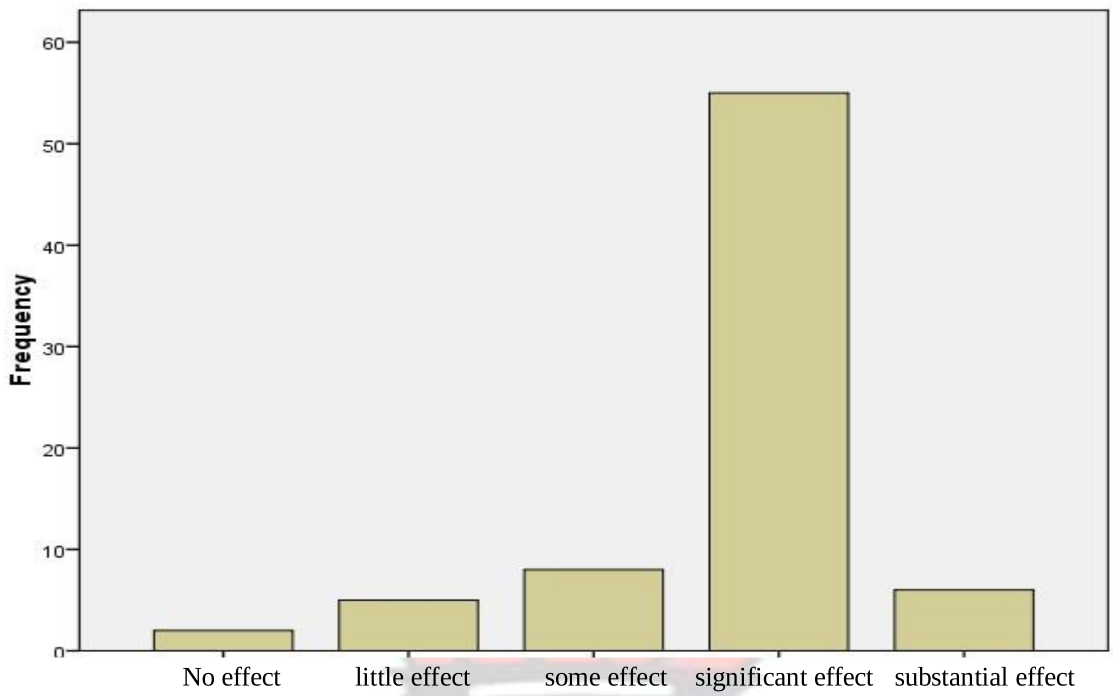


Fig 6.16 Contractors' perception of how political affiliation affects contract awards

This supports the generally widespread perceptions within the larger Ghanaian society that political affiliation is a major consideration in the award of public projects. The influence of political forces in the procurement processes for public projects means that contractors who underperform or in some cases abandon projects after receiving advance mobilisation payments are able win prestigious public projects without taking due cognisance of previous failings. The situation is made worse by the fact that many contractors are unwilling to speak about this situation and successive governments do not appear to demonstrate sufficient commitment to address the situation. This shows a strong influence of the political system in Ghana on construction processes such as the procurement process.

6.3.7.3 Lack of capacity to compete with foreign firms

The study also reveals that the "lack of capacity to compete with foreign owned firms" affected the performance of Ghanaian contractors (fig 6.17). Laxity in the regulatory systems means that contractors may be able to register in high financial class categories without sufficiently demonstrating requisite financial capacity. Weak financial positions hamper their ability to meet capital eligibility criteria for high profile and sometimes the more profitable projects. Where poorly resourced contractors are awarded projects, they may experience cashflow problems.

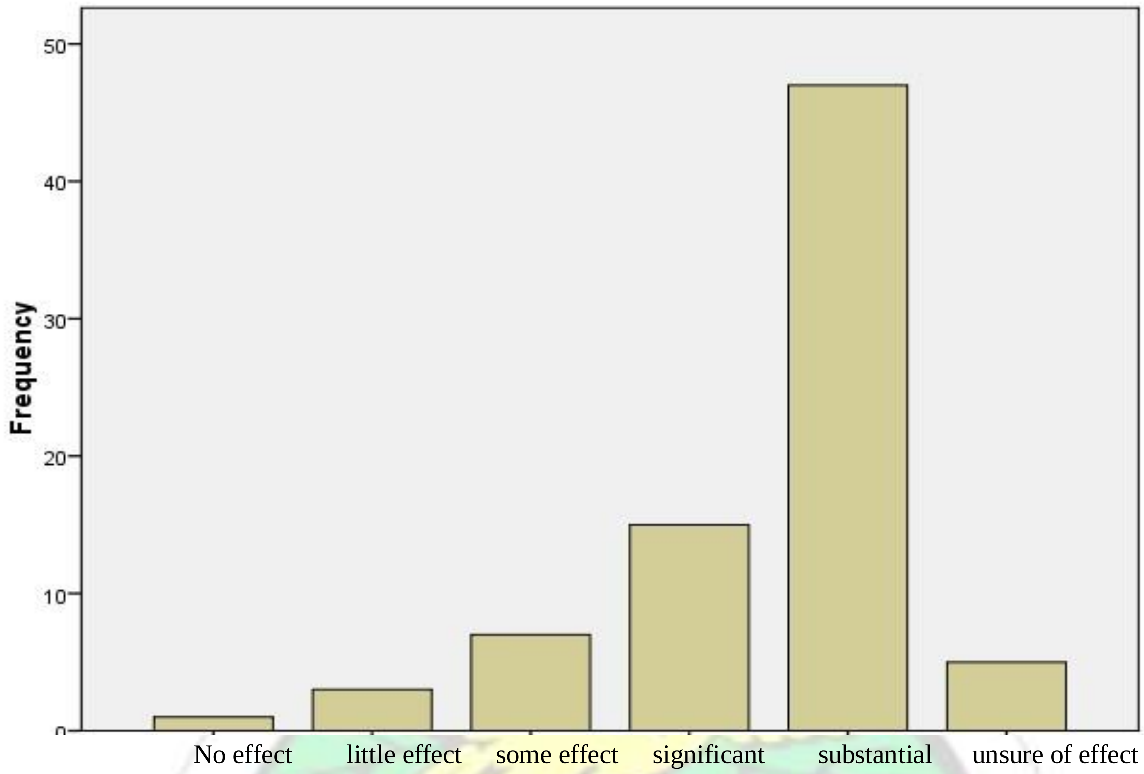


Fig 6.17 Perceptions of effect lack of capacity to compete with foreign firms on performance

6.3.7.4 Perceptions of bribery and corruption in the Ghanaian construction industry

The perception of "bribery and corruption in the Ghanaian construction industry" is very strong with 78% of respondents alluding to the significant effect the phenomenon has on the outputs of contractors and the overall performance of the industry (fig.6.18). It emerged during the interviews that political parties, their officials and some public officials are in the majority of cases paid a percentage of the overall contract sum in public projects and that payment in some instances is demanded ahead of the start of the procurement process.

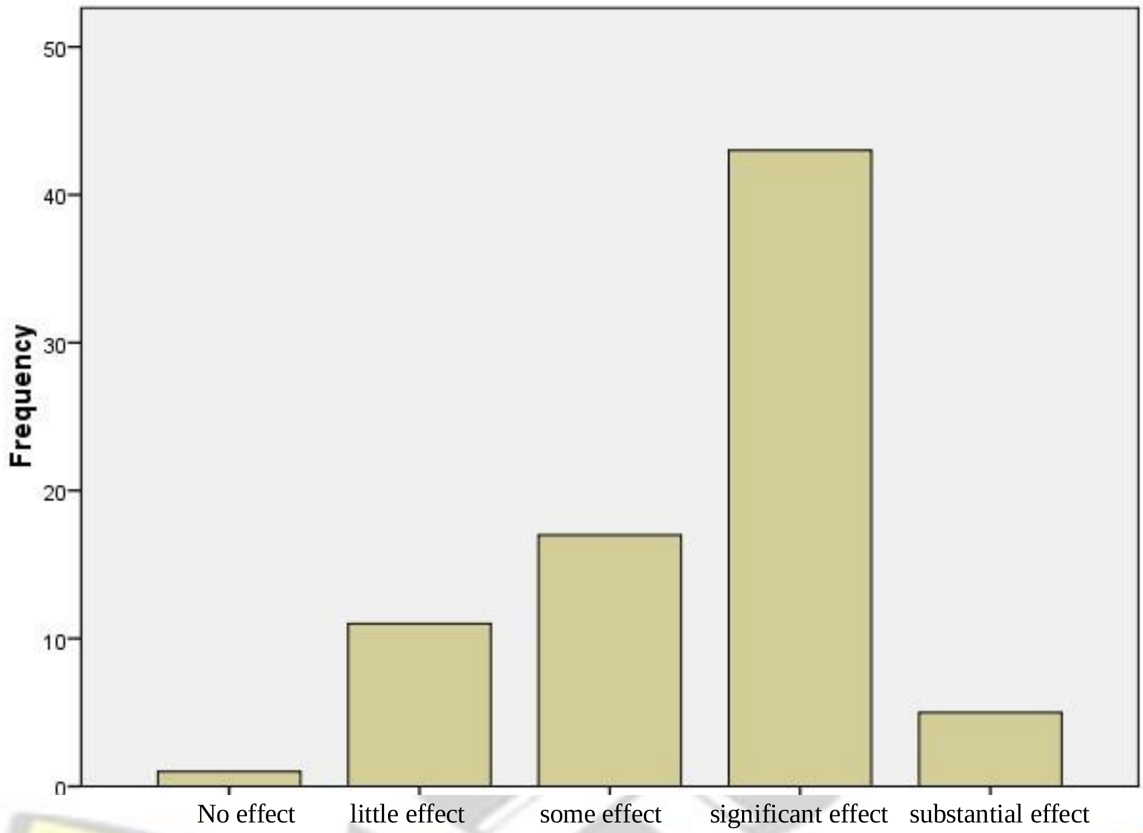


Fig 6.18 Effects of perception of corruption in construction industry on contractor performance

The study found that in many cases, contractors who pay or are willing to pay the illegitimate fee win contracts regardless of competence or the level of competition. This in many cases results in shoddy work as contractors have less money to achieve the levels of quality specified in project designs and specifications. There are reported instances of contractors who abandon projects after being paid mobilisation payments. In such instances, additional funds have to be sought to continue the same projects or the projects never materialise. This has led to the suspension of advance mobilisation payments to contractors working on public sector projects. This measure is not the solution to the problem as it only serves to deepen the problems of contractors in pre-financing projects owing to the high costs of finance for construction.

There is a perception of possible collusion between some contractors and some public officials responsible for public sector procurement and monitoring of projects. Thus contractors who may have been “blacklisted” for previous poor performance or abandoning projects may easily win new projects. A lack of effective barriers to entry into the Ghanaian construction industry for contractors means contractors with poor performance histories can easily obtain new registration under a separate identity. It is widely believed that owing to very strong vested political interests, successive governments have lacked the political will to address both the incidence and strong perceptions of corruption within the construction industry.

6.3.7.5 Low levels of technology used in the Ghanaian construction industry

The impact of the level of technology available to contractors on their performance is explored. Nearly 64% of the valid responses speak of “low technology available to contractors” having a significant impact on contractor performance as against 14% who do not see this as a major influence on contractor performance (fig.6.19).

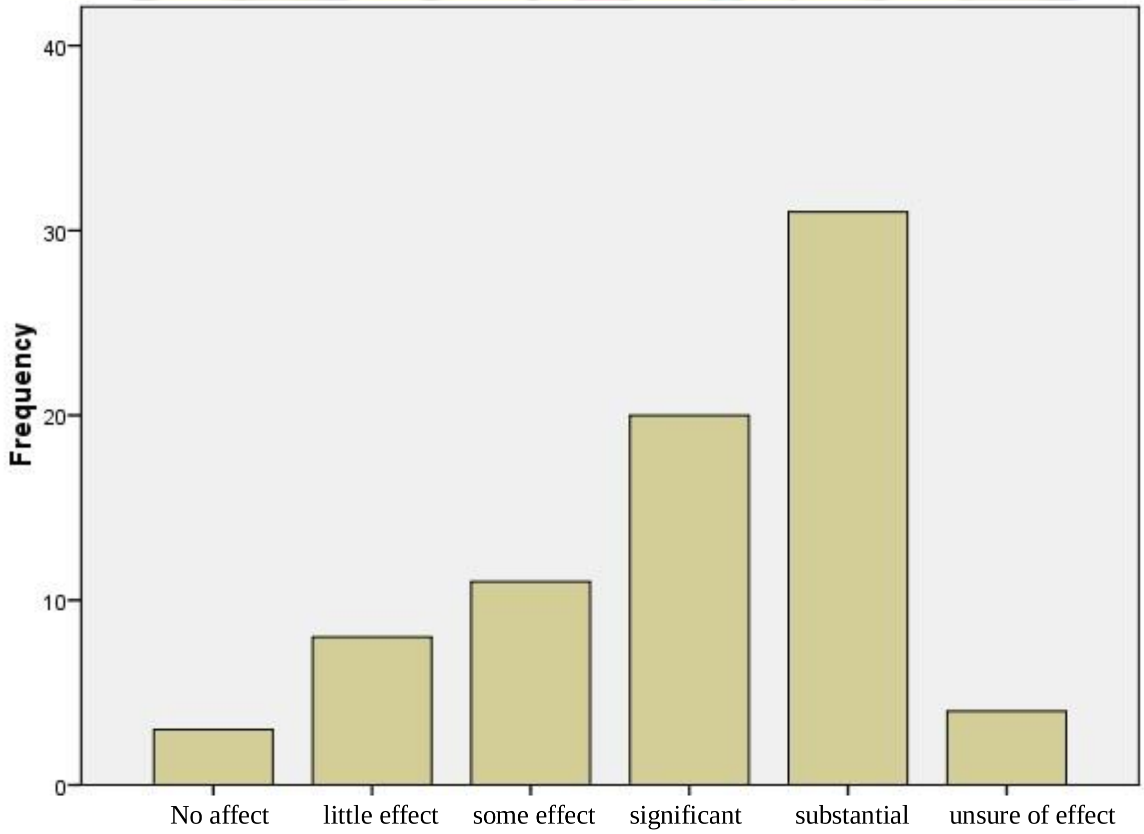


Fig 6.19 Perceptions of effect of low technology on contractor performance

Low levels technology of reflect low levels of mechanisation within the Ghanaian construction industry and a low utilisation of new and improved technologies easily available and in wide use in other countries. There is not much investment in research and development (R&D) as a deliberate strategy to improve levels of technology within the industry. Linkages between industry and academia have not been developed and as a result, the outputs of the academic sector have not been harnessed to address the problems of the industry.

6.3.7.6 Poor preparation of projects

"Poor preparation for projects" such as a lack of effective project planning was also identified in the study as an important factor responsible for contractor underperformance. This position is supported by nearly 64% of valid responses with only 14% of those responding not supporting this position (fig. 6.20). This demonstrates awareness amongst the participating contractors of the essence of good project preparation. However this awareness has not translated into project implementation leading to a high incidence of project delays and cost overruns on many projects. Available project management software has not been exploited for the benefit of the industry.

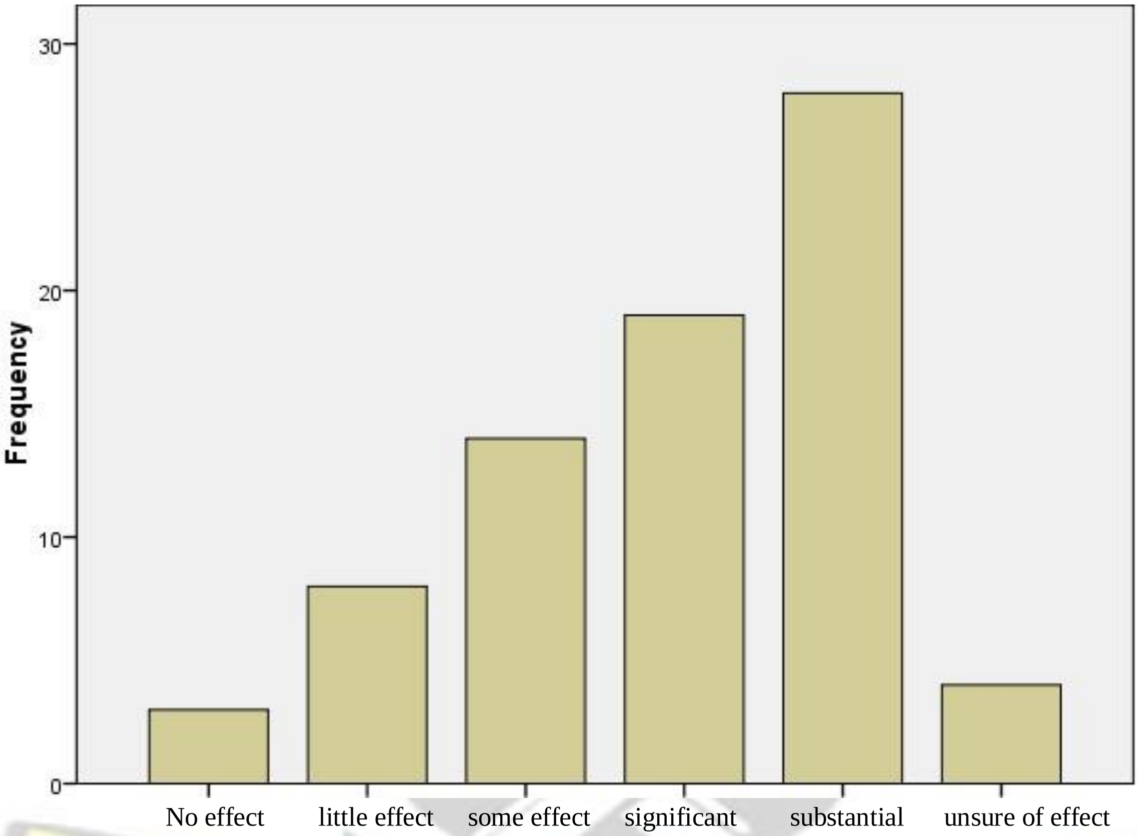


Fig 6.20 Perceptions of effect of poor preparation of projects on contractor performance

6.3.7.7 Inability of Ghanaian contractors to compete in competitive bidding processes

Another factor which is seen by contractors as affecting performance of contractors within the industry is the "inability to compete in competitive bidding processes". It is believed that fuelled by the perception of corruption within the industry, some contractors are able to influence the procurement process in public project awards. It also means that many Ghanaian contractors who would otherwise be able to do a good job are reluctant to bid and compete in large contracts with a potential for high profits leaving most high profile projects if they do not want to be drawn into the use of unorthodox biding methods. Effects of this on contractor performance are shown in fig. 6.21.

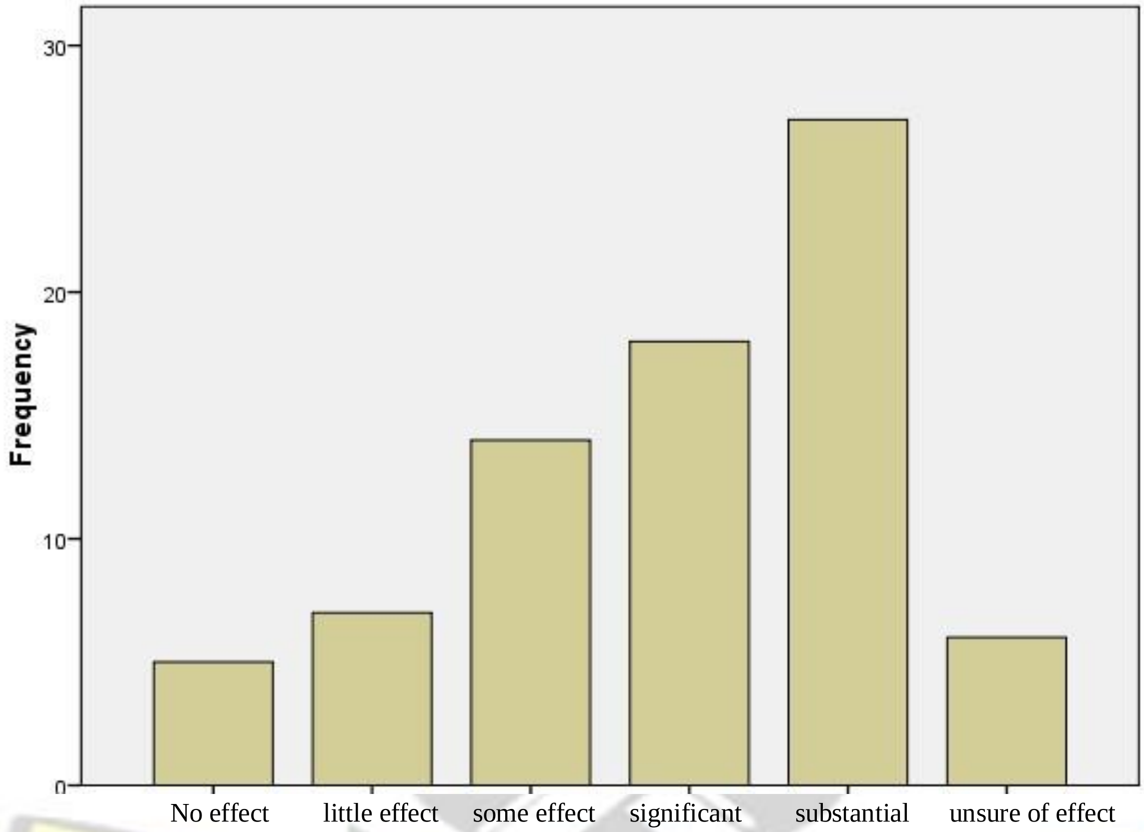


Fig 6.21 Views on how inability to compete in competitive bidding affect Ghanaian Contractors

6.3.7.8 Poor access to credit by contractors

One significant problem which Ghanaian contractors face is the difficulties associated with accessing credit for their projects. More than 65% of respondent contractors perceived this to a strong effect on contractor performance with less 10% who do not see it as seriously affecting contractor performance. Fig. 6.22 illustrates a breakdown of how contractors perceive the effect of credit on overall performance.

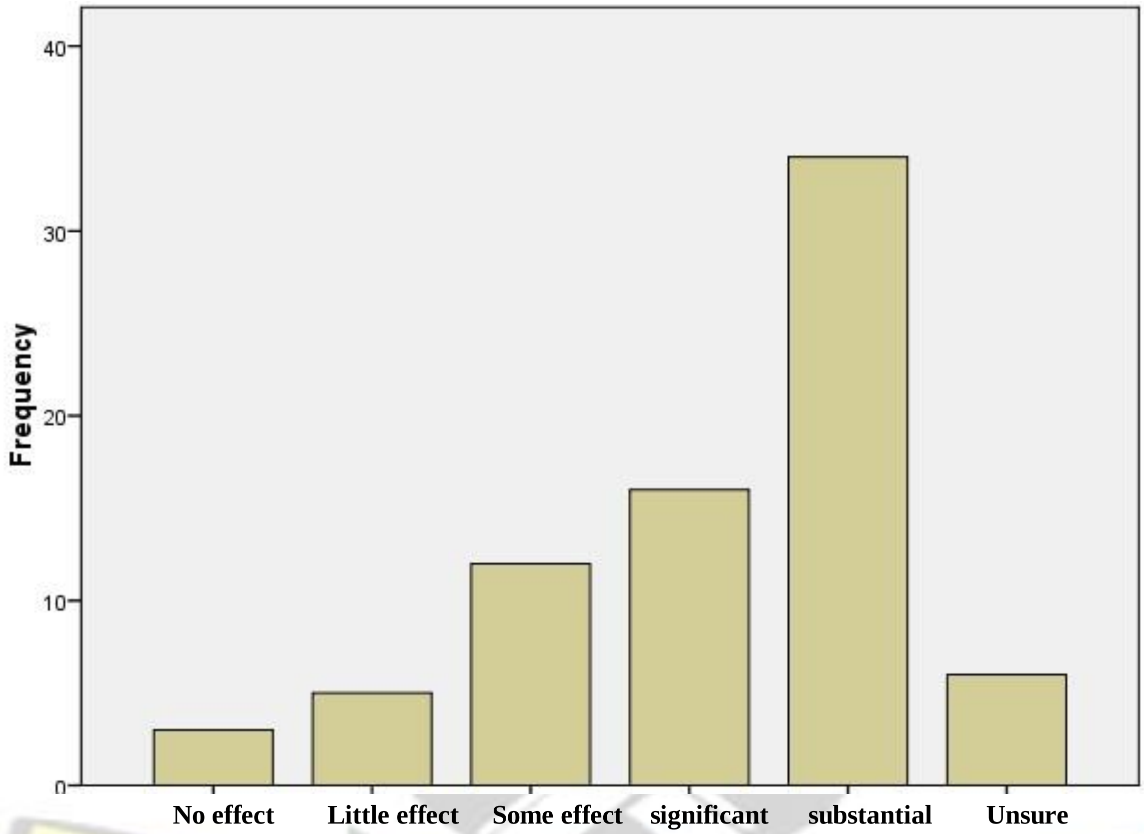


Fig 6.22 Effect of poor access to credit on contractor performance

6.3.7.9 Cumbersome payment processes

As seen in the survey, most Ghanaian contractors are mainly reliant on government sources for projects. Most public projects are facilitated by government departments and agencies. Awarding departments and agencies may have to endorse completed projects before payments are sanctioned by the Ministry of Finance before Bank of Ghana effects payment. Where projects are located in the regions, several visits may need to be made to Accra to process documentation before payments are received. Fig. 6.23shows contractor views of how such cumbersome process relating to payment for work done affects overall contractor performance.

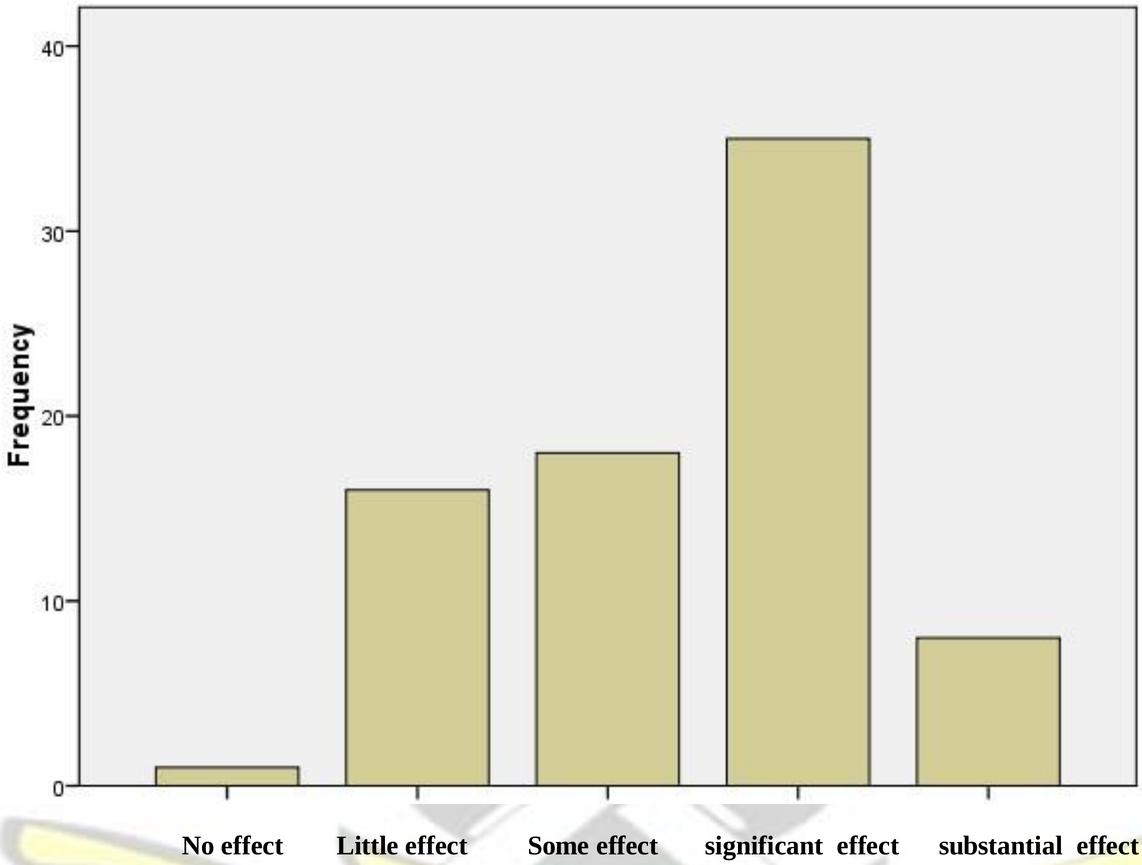


Fig 6.23 Effect of cumbersome payment systems on contractor performance

6.3.7.10 Personnel issues

An incentivised and motivated workforce is very important to overall output within an organisation. It is therefore important that organisations focus on their people and their welfare as a means to improving organisational productivity. Fig. 6.24 shows the distribution amongst respondents of how personnel issues affect contractor performance.

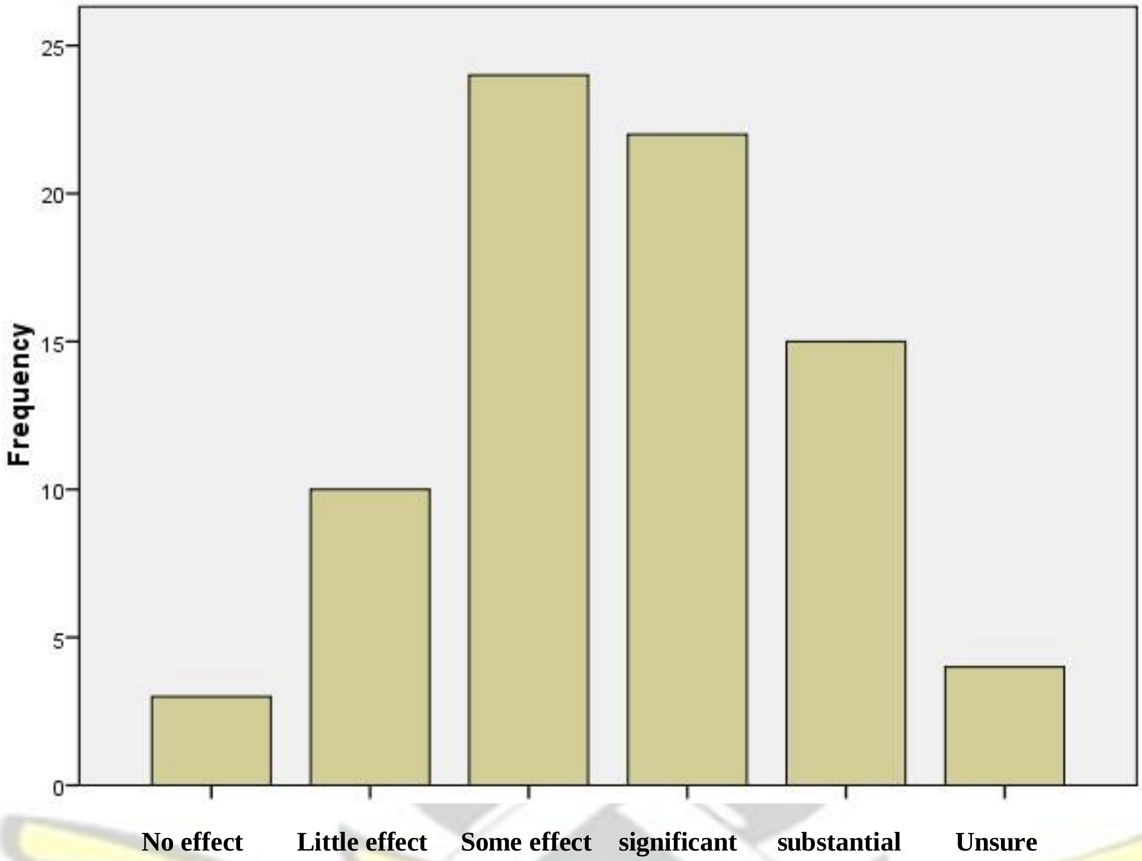


Fig 6.24 Effect of personnel issues on contractor performance

6.3.7.11 Inadequate supervision

The quality and effectiveness of project supervision contributes largely to project success. Inadequate supervision leads to poor quality which leads to losses arising from re-work and making good. Nearly 65% of the respondents endorse the position that the adequacy of supervision affects contractor output as shown in Fig. 6.25.

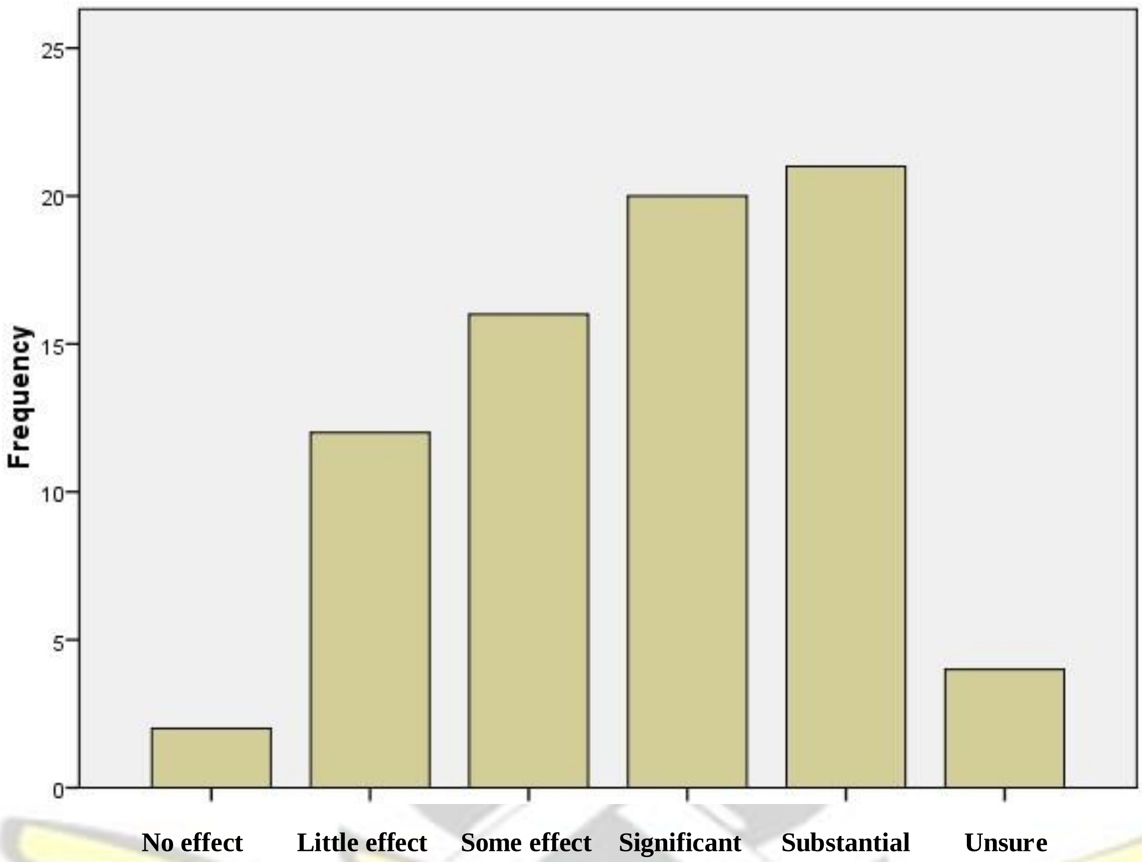


Fig 6.25 Effect of inadequate supervision on contractor performance

6.3.7.12 Revisions in Bills of Quantities

Revised Bills of Quantities arise from revisions in designs and may negatively impact on project costs and implementation. Taking additional care and effort can minimise the occurrence of such revisions. Fig. 6.26shows the distribution of how respondent contractors perceive revisions in BOQs to affect overall project performance of Ghanaian contractors.

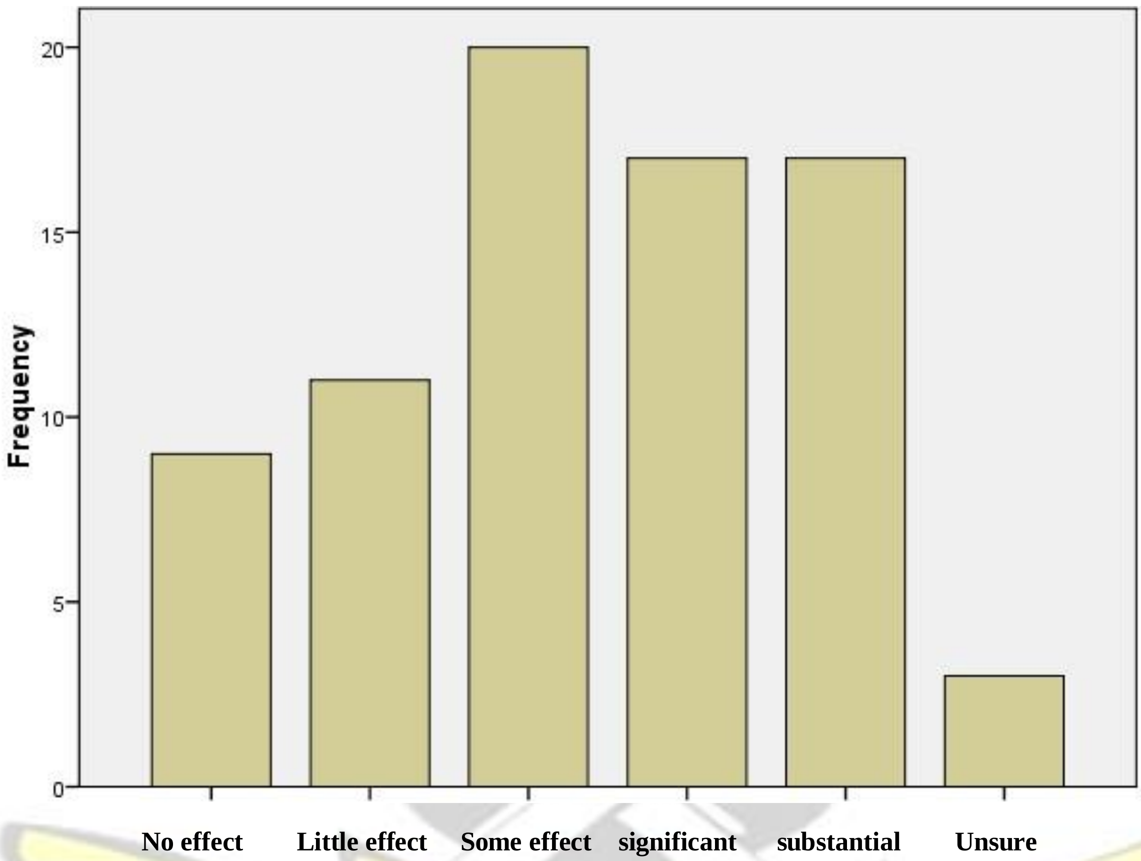


Fig 6.26 Effect of revision of BOQs contractor performance

6.3.7.13 The processes involved in becoming a contractor in Ghana are too easy There is a perception that the processes involved in becoming a contractor in the Ghanaian construction industry are too easy. The suggestion here is that there are not enough safeguards in place to ensure that entities without the requisite qualifications become contractors or win contracts. The registration processes and general regulatory need to be strengthened to ensure that contractors and would-be contractors have both the technical and financial capacities for the classes of membership for which they apply. Fig 6.27 below shows the contractor perspective of the perceived impact of the lack of effective barriers restricting entry into the Ghanaian construction industry as contractors.

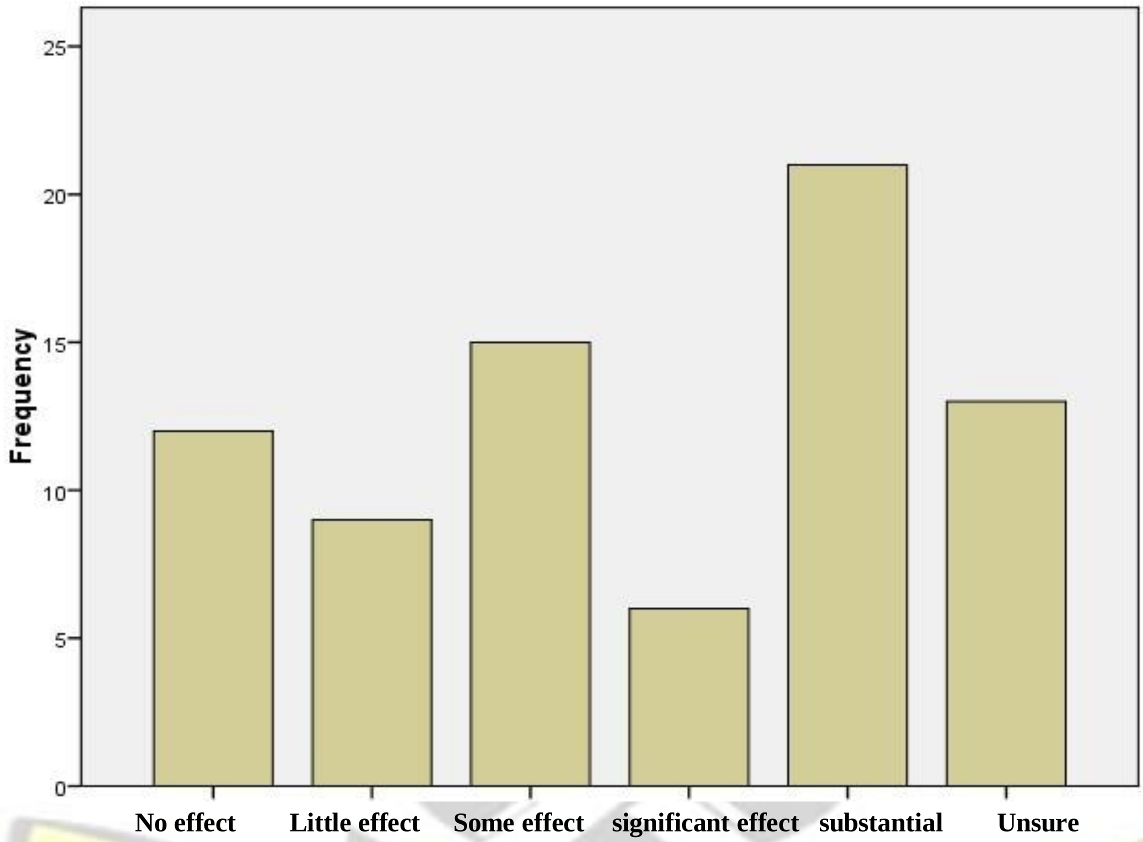


Fig 6.27 How "lack of effective barriers to entry "affects Ghanaian contractor performance

6.3.7.14 Low workloads of contractors in Ghanaian construction industry

Another concern within the construction industry in Ghana is the low workloads of Ghanaian contractors. The size of the number of contractors relative to the size of the economy means that too many contractors are chasing a few jobs. Contractor turnovers are thus small and profit margins low. This has a wide range of effects on other areas such as contractors" ability to invest in relevant technology, research and development and solvency. Fig. 6.28 below shows the distribution amongst contractors of how low workloads affect the performance of Ghanaian contractors.

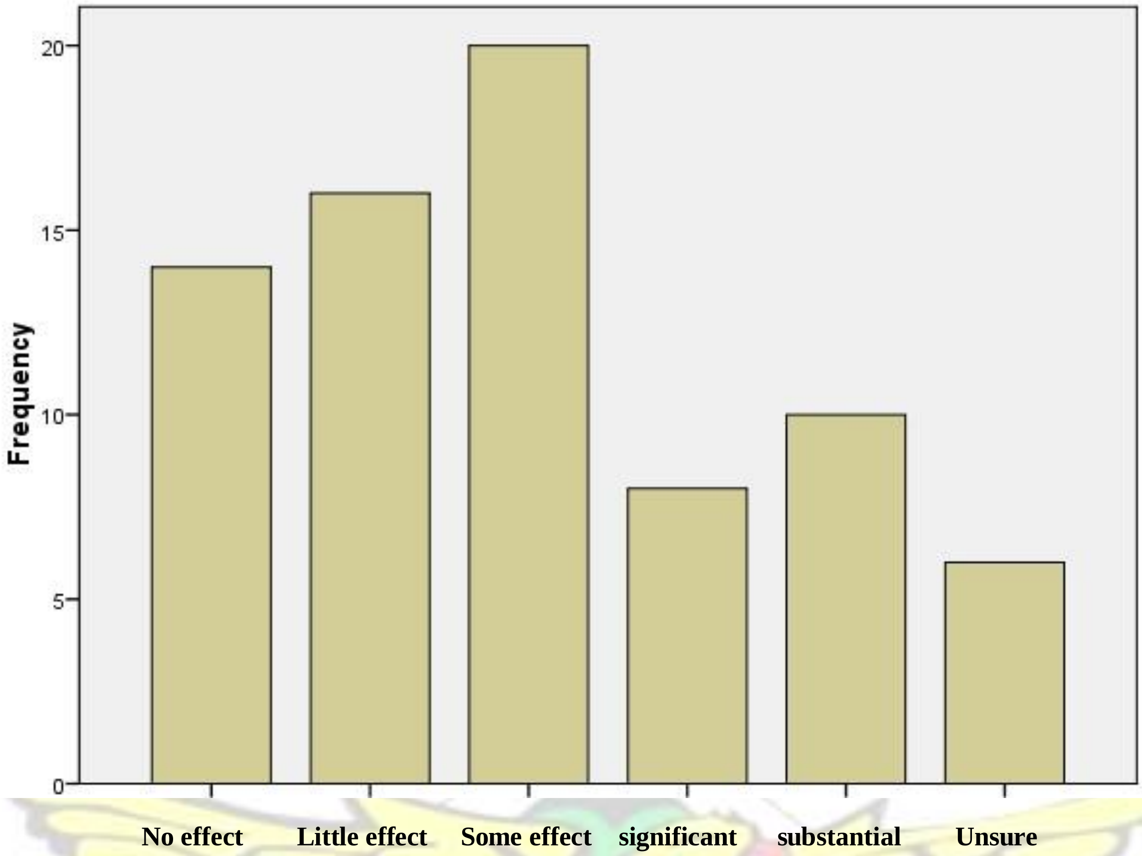


Fig 6.28 Effect of low workloads on contractor performance

6.3.8 Most critical of the factors affecting contractor performance

All 14 factors which were identified as affecting the performance of Ghanaian contractors are relevant. This use of factor analysis is not intended to extract any number of problems but identify which of the problems have the greatest impact on contractor performance from the contractror perspective. Using factor analysis, the component matrix produced is shown below in table 6.7.

Table 6.7 Component Matrix[a] - Problems which affect contractor performance

	Component

	1	2	3	4
Description of problem-Poor access to credit	.414	-.096	.601	.174
Description of problem-Delays in payment from government agencies	.599	.279	.175	-.348
Description of problem-Cumbersome payment processes	.532	.570	.010	-.147
Description of problem-Inability to complete in competitive bidding process	.477	.367	.072	-.335
Description of problem-Lack of capacity to compete with foreign owned firms	.124	.567	-.052	-.278
Description of problem-Personnel issues	.486	.014	-.527	.175
Description of problem-Low workloads	.439	.263	.069	.569
Description of problem-Bribery and corruption in the construction industry	.590	-.081	.540	.070
Description of problem-Low technology available to construction firms	.372	-.581	.166	-.214
Description of problem-Inadequate supervision of projects	.703	-.276	-.191	.034
Description of problem-Poor preparation for projects	.664	-.392	-.359	-.154
Description of problem-Revision of bills of quantities during project implementation	.490	-.363	.030	-.043
Description of problem-Contracts awarded on the basis of one's political affiliation	.136	.151	.103	.672

Description of problem-Processes involved in becoming a construction firm are too easy	.492	.157	-.401	.245

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Inspection of the component matrix shows the factor "cumbersome payment processes" has two factor loadings greater than 0.5. This distorts the matrix structure and must thus be discarded. Using factor analysis with the factor "cumbersome payment processes" deleted produces the variance matrix and scree plot shown respectively in table 6.8 and fig. 6.29.

Table 6.8 Variance matrix with "cumbersome payment systems" deleted

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.201	24.622	24.622	3.201	24.622	24.622	2.400	18.463	18.463
2	1.468	11.290	35.912	1.468	11.290	35.912	1.849	14.222	32.685
3	1.338	10.294	46.205	1.338	10.294	46.205	1.568	12.060	44.745
4	1.277	9.821	56.026	1.277	9.821	56.026	1.467	11.282	56.026
5	.973	7.483	63.509						
6	.942	7.246	70.755						
7	.927	7.129	77.884						
8	.686	5.280	83.164						
9	.680	5.227	88.392						
10	.479	3.684	92.076						
11	.452	3.480	95.556						
12	.382	2.940	98.496						
13	.195	1.504	100.000						

Extraction Method: Principal Component Analysis.

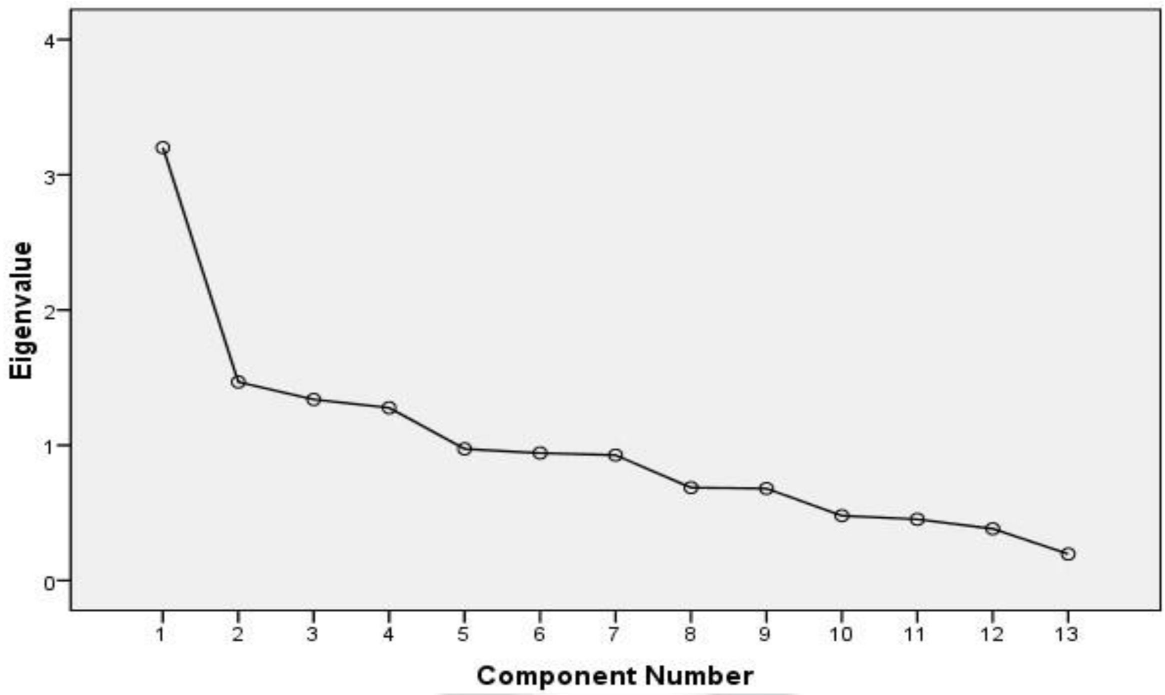


Fig 6.29 Scree plot without "cumbersome payment systems"

Since the number of factors is less than 20, the scree plot approach is adopted. From inspection, the first point after which the curve first becomes almost parallel to the horizontal is after the 5th component. This suggests that 5 components will be extracted, one more than what is shown by the rotated component matrix (table 6.9). The factor analysis is done again with instructions to extract 5 factors. From the rotated matrix structure, the 5 factors extracted are:

1. Poor access to credit
2. Lack of capacity to compete with foreign owned firms
3. Low technology available to construction firms
4. Poor preparation for projects e.g. project planning
5. Contracts awarded on the basis of one‟s political affiliation

Amongst the 5 factors which had the greatest impact on Ghanaian contractor performance, "access to credit" was the factor cited by most respondents as affecting their performance.

This position is supported by the factor loadings which show "access to credit" with the highest factor loading as having the biggest variance compared to the other factors. The reasons why banks shun contractor finance are further explored through a survey of major banks in Ghana and reported separately in this report.

Table 6.9 Rotated component matrix without "cumbersome payment systems".

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Description of problem-Poor access to credit	.031	.075	.021	.828	.065
Description of problem-Delays in payment from gov't and gov't agencies	.198	.185	.622	.276	-.055
Description of problem-Inability to complete in competitive bidding process	.223	-.074	.653	.230	-.110
Description of problem-Lack of capacity to compete with foreign owned firms	-.147	-.017	.745	-.302	.151
Description of problem-Personnel issues	.679	.024	.088	-.145	.251
Description of problem-Low worklloads	.287	-.208	.126	.381	.586
Description of problem-Bribery and corruption in the construction industry	.009	.451	.311	.576	.237
Description of problem-Low technology available to construction firms	.101	.790	.053	.093	-.115
Description of problem-Inadiquate supervision of projects	.733	.179	.075	.331	-.034
Description of problem-Poor preparation for projects	.799	.307	.021	.131	-.201
Description of problem-Revision of bills of quantities during project implementation	.237	.725	-.033	.045	.125
Description of problem-Contracts awarded on the basis of one's political affiliation	-.065	.084	-.115	.058	.776
Description of problem-Processes involved in becoming a construction firm are too easy	.504	.073	.260	-.167	.435

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

6.3.9 Contractor views on why banks do not support construction

In this section, Ghanaian contractor views on banks" reluctance to finance construction projects are explored. Contractors were asked how each of the 7 selected problems below generally percieved to affect contractor performance impacted on their chances of raising finance. The problems are:

1. Construction firms lack collateral

2. Many construction firms do not pay back contracted loans
3. Interest rates are too high and thus bank loans are not attractive to construction firms
4. Bank loans are not suitable for construction
5. Low profit margins in the construction industry
6. The government does not pay contractors on time to enable them to repay back loans
7. Contractors lack the personnel to successfully manage projects funded with loans

Table 6.10 Total Variance explained : factors why banks do not support contractors

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.047	29.238	29.238	2.047	29.238	29.238	1.617	23.107	23.107
2	1.178	16.829	46.068	1.178	16.829	46.068	1.599	22.849	45.956
3	1.151	16.447	62.514	1.151	16.447	62.514	1.159	16.559	62.514
4	.883	12.614	75.129						
5	.694	9.914	85.043						
6	.584	8.347	93.389						
7	.463	6.611	100.000						

Extraction Method: Principal Component Analysis.

From the rotated component matrix in table 6.11 below, the 3 factors extracted are:

1. Low profit margins in the construction industry
2. The government does not pay contractors on time to enable them to repay back loans
3. Construction firms lack the requisite personnel to successfully manage projects.

These reasons are identified by the contractors surveyed as hampering their efforts to attract credit.

Table 6.11 Rotated Component Matrix[a] - factors why banks do not support contractors

	Component		
	1	2	3
Factors-Lack collateral	.153	.678	.080
Factors- Do not pay back contracted loans	.636	.266	.200
Factors-Interest rate are too high	-.210	.521	-.586
Factors-Bank loans are not suitable for construction	.694	.225	-.351
Factors-Profit margins are low	.200	.809	.071
Factors-Government does not pay contractors on time	-.077	.301	.800
Factors-Lack the personnel to successfully manage projects funded with loans	.787	-.025	.040

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Table 6.11 Rotated Component Matrix[a] - factors why banks do not support contractors

	Component		
	1	2	3
Factors-Lack collateral	.153	.678	.080

Factors- Do not pay back contracted loans	.636	.266	.200
Factors-Interest rate are too high	-.210	.521	-.586
Factors-Bank loans are not suitable for construction	.694	.225	-.351
Factors-Profit margins are low	.200	.809	.071
Factors-Government does not pay contractors on time	-.077	.301	.800
Factors-Lack the personnel to successfully manage projects funded with loans	.787	-.025	.040

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations

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6.4 SURVEY OF FINANCIAL INSTITUTIONS

This section featured interviews with representatives of Ghanaian financial institutions to explore the nature of the relationships between Ghanaian banks and construction firms and the support offered by Ghanaian banks to Ghanaian contractors. The survey targeted all 25 universal banks in Ghana with 18 responses representing 72% of the target population. The survey was conducted using a structured questionnaire which had been previously tested on three bankers randomly selected from three universal banks.

The decision to restrict the survey to only the universal banks was taken because whilst there is a large and a growing presence of non-banking financial institutions, the sector was largely unregulated at the time of the survey and data relating to this sector such as number of nonbank financial institutions and their locations were difficult to access. Again whilst some of these were known to be involved in construction finance, there were substantial variations in the nature of their operations that a decision was made to limit the survey to the established universal banks.

6.4.1 Banks' support for construction projects

Respondents were asked whether they offered finance for construction projects or not. 14 out of the 18 respondents provided finance for construction firms representing 78% of the respondents whilst 22% did not offer any support for construction projects at all as shown in fig. 6.30 below.

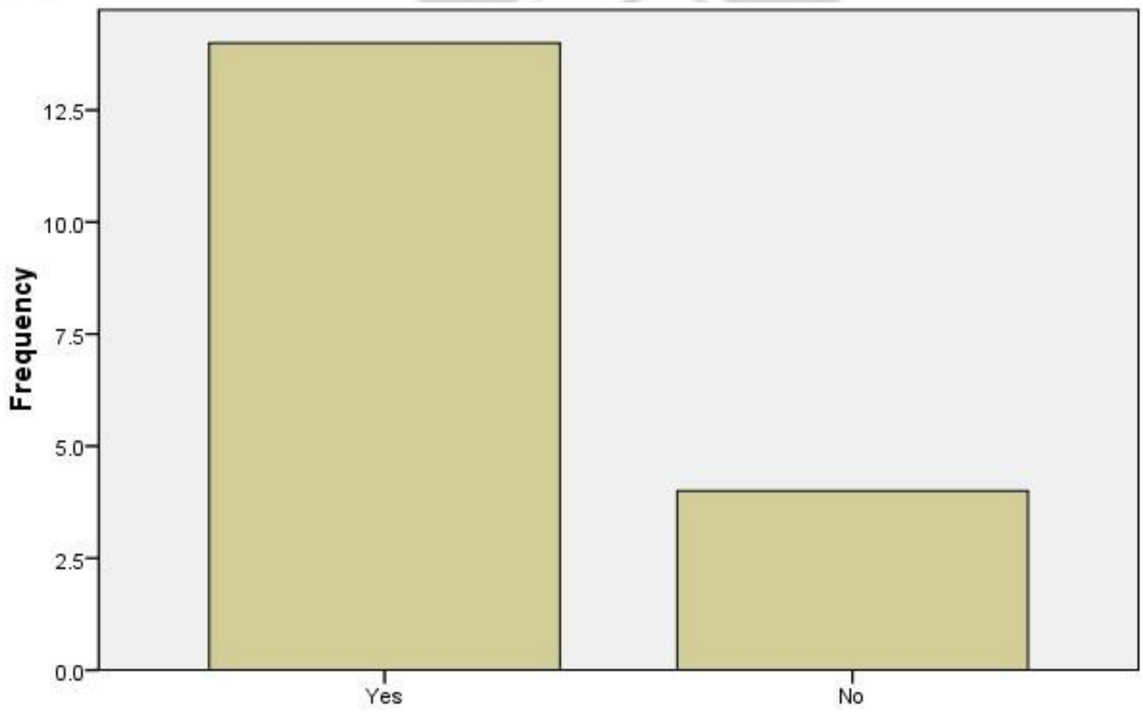

Fig 6.30 Banks which finance construction

6.4.2 Volume of finance offered to contractors

The volume of finance offered to contractors is then explored. On a scale of 1 to 5 representing "little or no support offered" to "substantial support", contractors were asked to indicate the levels of support they offered contractors. As seen in fig.6.31, more than half of respondent banks which offered support to contractors, representing 44.4% of the overall respondents described the volume of support they offered as being “very good” or “substantial”. 22% offered moderate support whilst 2 banks described the levels of support they offered as being low. Whilst nearly 80% of valid responses indicate support for contractors, the support offered in real terms is only average as only 44% of the respondents could assert that their support is very good or substantial. It can also be argued that “very good” or substantial support on the part of the banks may not necessarily equate to sufficiency.

Fig 6.31 Volume of finance provided by banks to construction firms

6.4.3 Interest rates offered to contractors by banks

Whilst it can be inferred from the study that there are ample opportunities for Ghanaian contractors to access bank credit, the prevailing interest rate regime is prohibitive with none of the banks which participated in the survey offering anything less than 20% interest rates for contractors. 10 out of 14 banks which offered support for contractors representing 56% of all respondents and 71.4% of the valid responses offered interest rates between 25.1% and 30% to contractors (Fig. 6.32). This contrasts sharply with the UK for example where business lending rates may be less than 10% per annum.

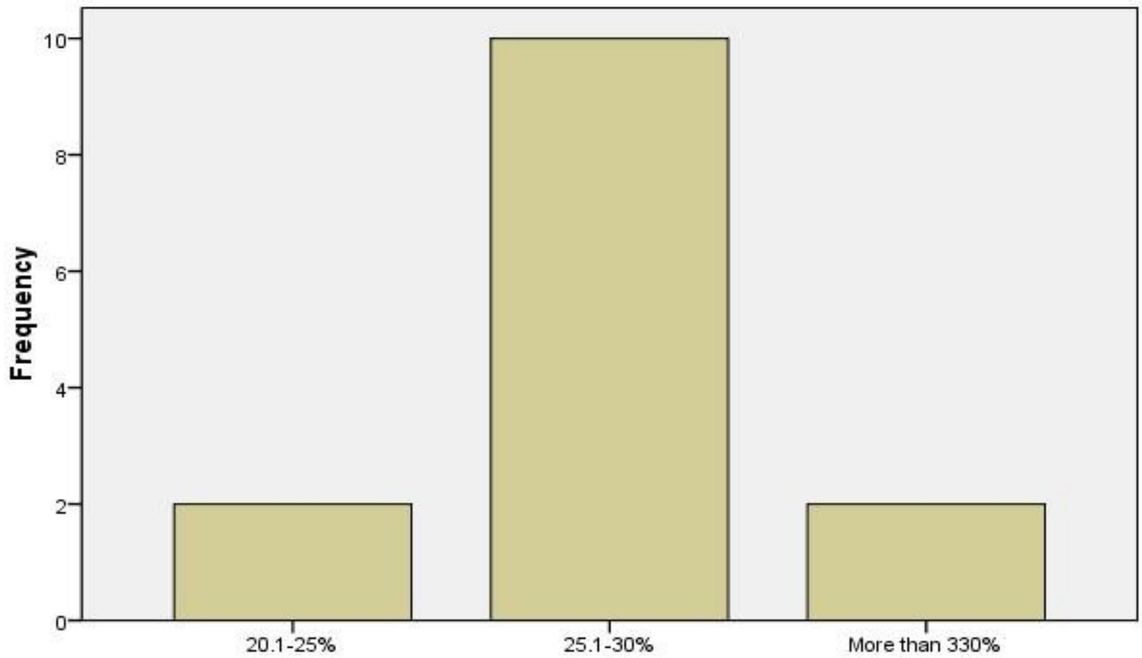

Fig 6.32 Banks' Interest rates for contractors

6.4.4 Factors which affect Ghanaian banks' decision to refuse contractors credit The reasons commonly cited by banks for declining contractor applications for credit were then explored. On a scale of 1 to 5, with 1 representing "no effect" and 5 representing "very strong effect", contractors were asked to rate thirteen (13) factors obtained from literature and through interaction with bank employees and construction professionals.

6.4.4.1 Overdependence of Ghanaian contractors on government for cashflow

63% of valid responses cited the high dependence of Ghanaian contractor cashflow on government projects as the most common reason offered by banks for refusing contractor applications for credit. Banks were asked about the effects of this overdependence on government sources for cashflow on their decisions whether or not to support contractors. Figure 6.33 shows the representation of how contractor overdependence on government for cashflow on bank decisions to support contractors.

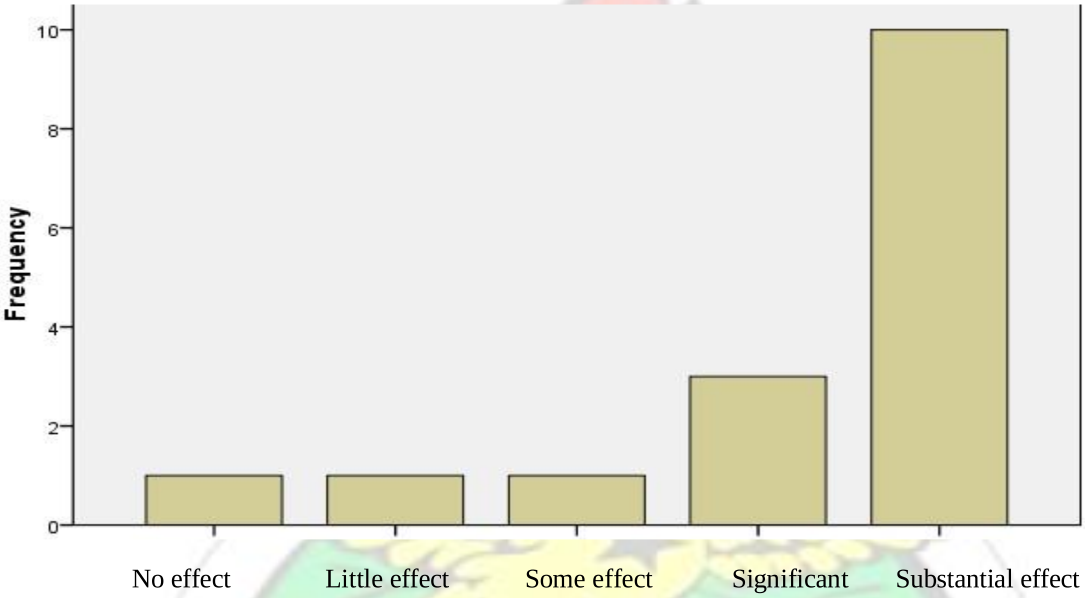

Fig 6.33 Effect of contractor reliance on Government for cashflow on ability to raise credit

6.4.4.2 Politicisation of construction industry

Next, the perception that the Ghanaian construction industry was heavily politicised was cited as a major reason for denying contractor applications for credit, a position endorsed by 53% of valid responses. The effect of these perceptions on contractor ability to raise bank finance is shown in fig.6.34. Banks generally are averse to accusations of meddling in politics and will stay away from projects or contractors perceived to be linked to partisan interests. It is widely reported within the Ghanaian construction industry that in many instances, especially at the district level, projects are awarded to political party activists who may not be contractors. Such projects are awarded not on the basis of construction competence but purely on political considerations. In the course of conducting interviews for this research, it emerged that politicians without adequate construction experience awarded projects may go on to "sell-on" their projects to contractors for a fee ranging between 10% and 30% of the overall contract sum. Others may go on to construct the projects but the lack of construction experience invariably affects client satisfaction.

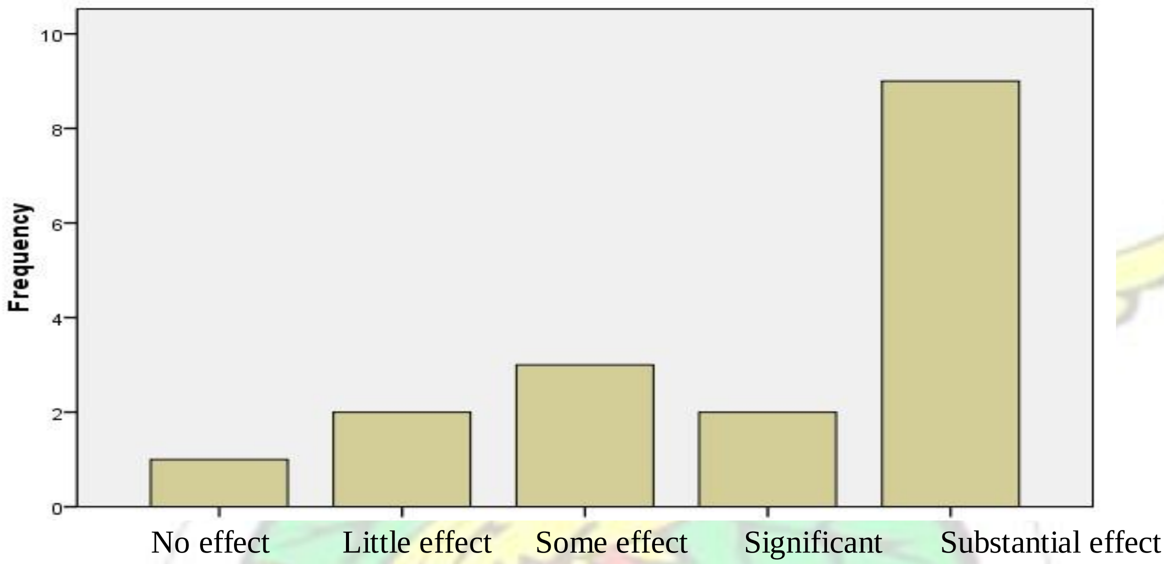

Fig 6.34 Effect of politicisation of industry on bank lending to contractors

6.4.4.3 Perceptions of corruption in Ghanaian construction industry

The third reason cited by banks for refusing credit is "the perception of widespread corruption in the construction industry". Irregularities in public procurement are widely reported within the construction community. Some contractors are said to pay illegal charges – sometimes fixed percentages up to a total of 30% of overall contract cost – to help them win contracts. Illegal payments may also be demanded during construction and also before certificates are released.

It is believed that contractors who refuse to pay such illegal charges may find it difficult to win projects. Where they win projects, they may experience delays before certificates are issued as well as delays to payments due. It is difficult to ascertain the veracity of such claims since contractors who experience this are generally reluctant to report or discuss this for fear of being victimised in the award of future projects. The payments of such fees generally reduce the profitability of projects, lead to shoddy work and in some cases lead to abandoned projects thus increasing the risk to banks and other financial institutions of financing construction projects. Bankers‟ perceptions of how this phenomenon affects Ghanaian contractors‟ ability to raise bank finance are summarised in fig. 6.35.

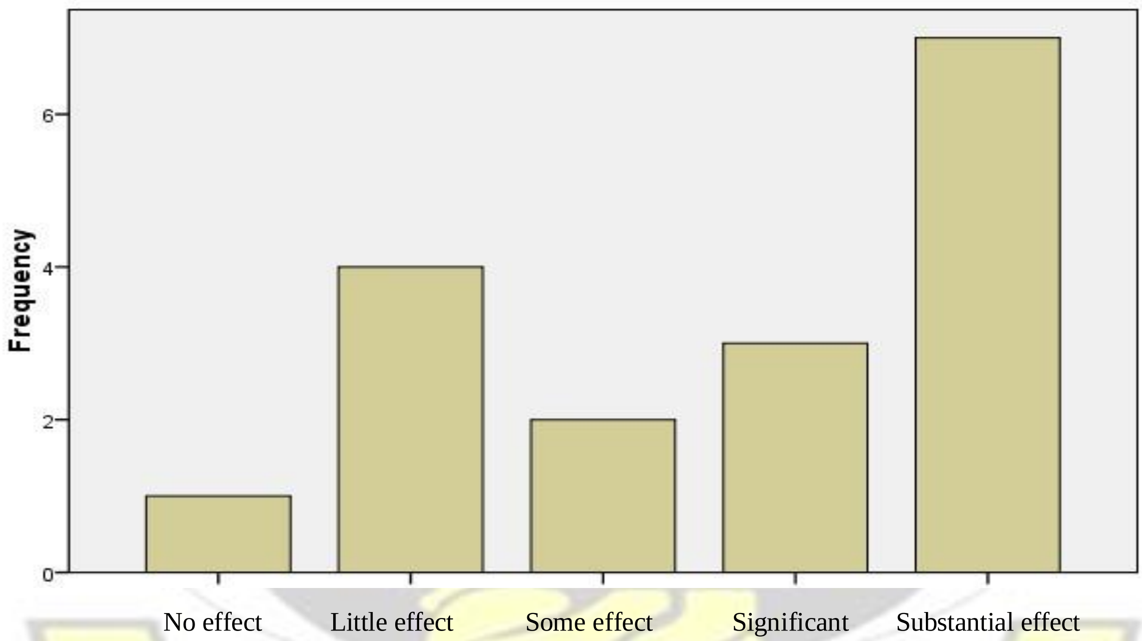

Fig 6.35 Effect of perception of widespread corruption on ability to raise finance

6.4.5.1 Banks which have policies not to support construction

Banks were asked to show on a scale of 1 to 5 showing the extent to which it specific policy decisions not to finance construction affected contractors‟ ability to raise bank finance. 53% of the respondents scored 1 or 2, indicating that that was not a major cause for those respondents whilst for the 30% of the respondents chose 4 and 5; this was a major cause for refusing contractor loan applications. The responses indicate that 30% of respondents confirmed that it was the position of their banks not to finance construction projects. This shows that it is not a popular policy position for banks as a policy not to finance construction projects (fig. 6.36).

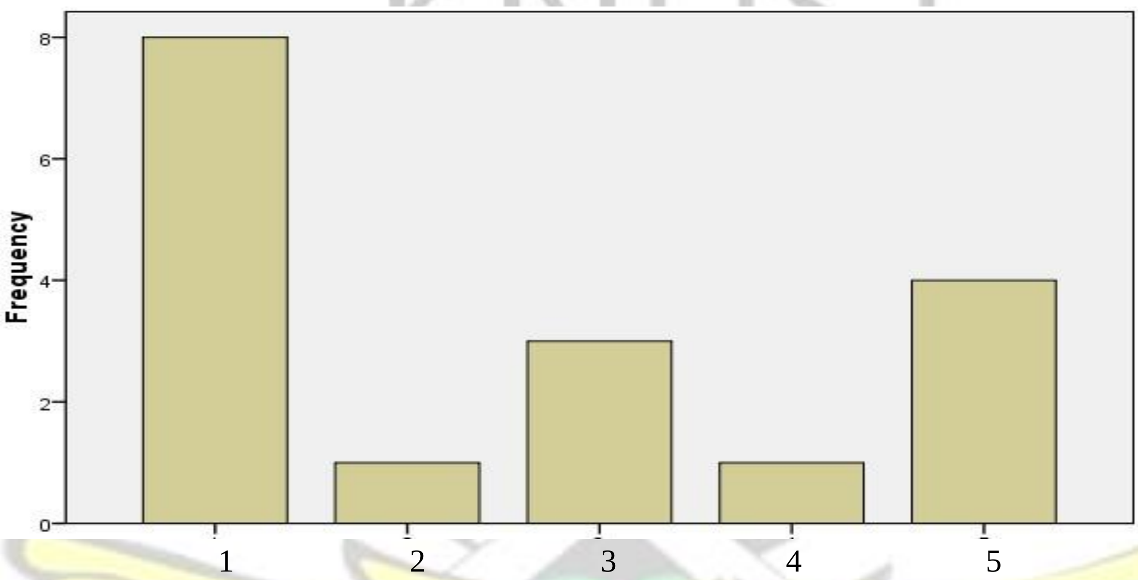

Fig 6.36 Banks which have clear policies not to finance contractors

6.4.5 Reasons for low levels of support offered contractors by Ghanaian banks Banks were asked to give reasons for the low levels of financing provided for contractors choosing from a pool of 12 reasons above:

1. Construction firms lack collateral
2. Construction firms do not repay loans
3. Construction firms are too reliant on government for cashflow
4. Construction firms lack experienced personnel to manage loan funded projects
5. Construction firms lack the relevant equipment to undertake projects
6. Construction firms do not have adequate turnover

7. Construction firms do not make enough profits
8. Construction firms do not win enough projects to break-even
9. Construction firms never present business plans
10. Construction firms do not present robust business plans
11. The construction industry is too heavily politicised
12. A perception of widespread corruption in the industry erodes confidence in the construction industry.

The responses were analysed using factor analysis. The scree plot (fig. 6.37) suggests that 11 out of the 12 factors are extracted which were considered too many. Hence the latent root approach is used. The table of variances for the factor analysis is presented in table 6.1 which shows five (5) factors should be extracted. From the rotated component matrix diagram shown in table 6.13, the 5 factors extracted are:

1. Construction firms do not repay loans
2. Construction firms lack the relevant equipment to undertake projects
3. Construction firms do not make enough profits
4. Construction firms never present business plans
5. A perception of widespread corruption in the industry erodes confidence in the construction industry

These reasons given by the banks have a higher value to the discussion of why banks do not support to contractors and therefore need more consideration.

Table 6.12 Total variances explained for reasons why most banks do not support contractors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.440	28.668	28.668	3.440	28.668	28.668	2.629	21.905	21.905
2	2.425	20.208	48.876	2.425	20.208	48.876	2.288	19.069	40.974
3	1.787	14.890	63.766	1.787	14.890	63.766	1.843	15.362	56.336
4	1.433	11.943	75.709	1.433	11.943	75.709	1.803	15.025	71.362
5	1.099	9.160	84.869	1.099	9.160	84.869	1.621	13.508	84.869
6	.575	4.788	89.657						
7	.514	4.283	93.940						
8	.406	3.382	97.322						
9	.186	1.548	98.870						
10	.119	.996	99.865						
11	.012	.100	99.966						
12	.004	.034	100.000						

Extraction Method: Principal Component Analysis.

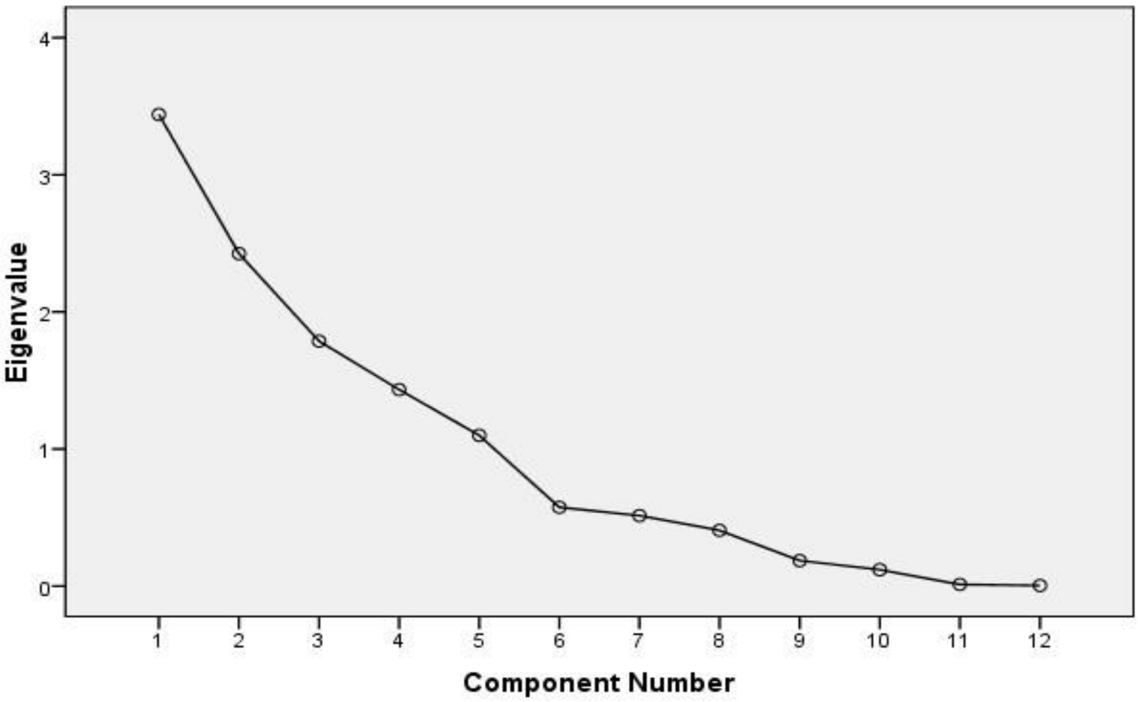

Fig 6.37 Scree Plot - reasons why most banks do not support contractors

Table 6.13- Rotated Component Matrix[a] - reasons why most banks do not support contractors

	Component

	1	2	3	4	5
Contractors lack collateral	.431	-.023	-.160	-.333	.711
Contractors do not repay loans	.017	-.061	.022	.842	-.224
Contractors are too reliant on government for cashflow	.046	.781	-.308	-.400	-.145
Contractors have no experienced personnel to efficiently manage loan funded project	.796	-.006	-.138	-.094	.193
Contractors lack the relevant equipment to undertake projects	-.021	.100	-.125	-.166	-.899
Contractors do not have adequate turnover	.185	.016	-.025	.755	.357
Contractors do not make enough profits	.053	-.071	.971	-.080	.048
Contractors do not win enough projects to break-even	.566	-.228	.699	.228	-.032
Contractors never present business plans	.923	-.005	.274	.081	-.088
Contractors do not present robust business plan	.770	.158	.189	.298	.239
The construction industry is too politicised	.054	.885	-.263	-.057	-.056
A perception of widespread corruption		.893			

	-.033		.276	.243	.025

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

6.4.6 Banks which offer mortgage facilities

In addition to support provided to contractors, the participating banks were asked whether they offered mortgage facilities. 40% of the respondent banks offered mortgage products whilst 60% did not offer any mortgage products as shown in fig 6.38. Given the high housing deficit gap in Ghana, it is surprising that not many more banks offer mortgages. The experience of the UK shows that banks actively encourage eligible borrowers to acquire mortgages. Using devices such as low interest rates, longer loan periods and 100% mortgages, banks are able to increase borrower numbers.

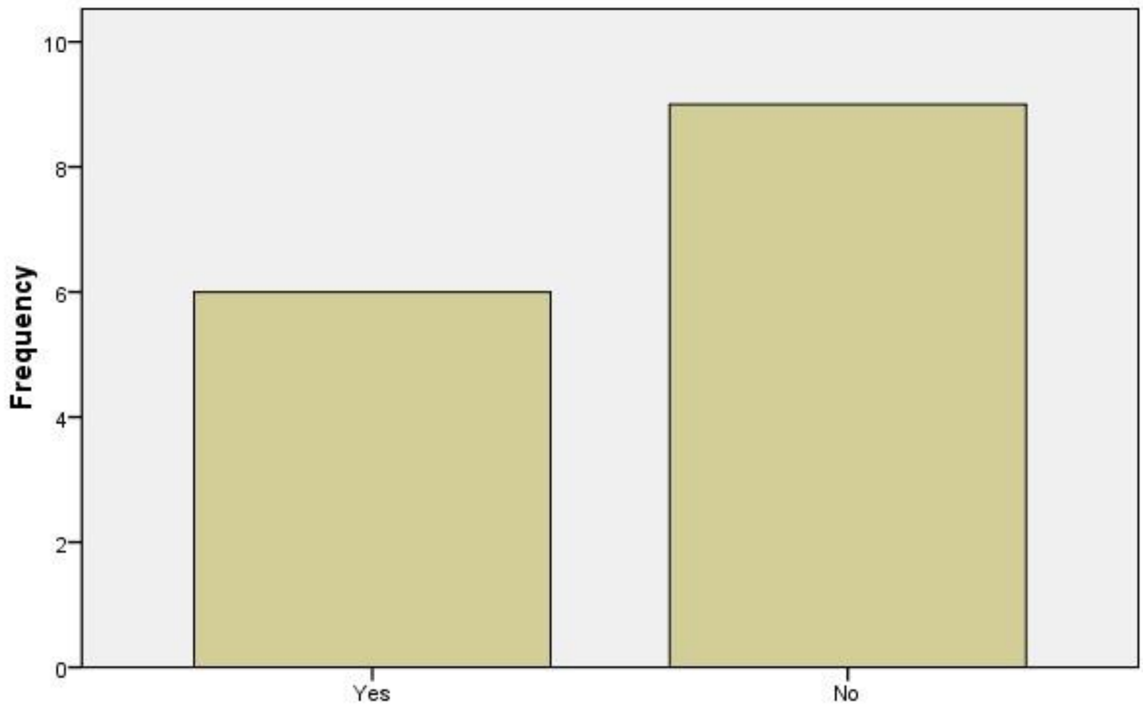

Fig. 6.38 Banks which offer mortgage facilities

6.4.6.1 Average terms for mortgages

Unlike in the UK where mortgages were offered for a 25 to 30 year period, most mortgages in Ghana were offered for a maximum 15 years with 78% of respondents offering mortgages for a 1 to 15 year duration (fig. 6.39). Given the relatively low salary levels, high interest rates for borrowing and high inflationary trends in Ghana, both the deposits required for house purchases and monthly mortgage repayments are too high for many Ghanaians. In a welcome development, there is an emerging trend of Ghanaian contractors who in conjunction with banks offer 100% mortgages. However, owing to the high selling prices and high interest rates, many Ghanaians are still priced out.

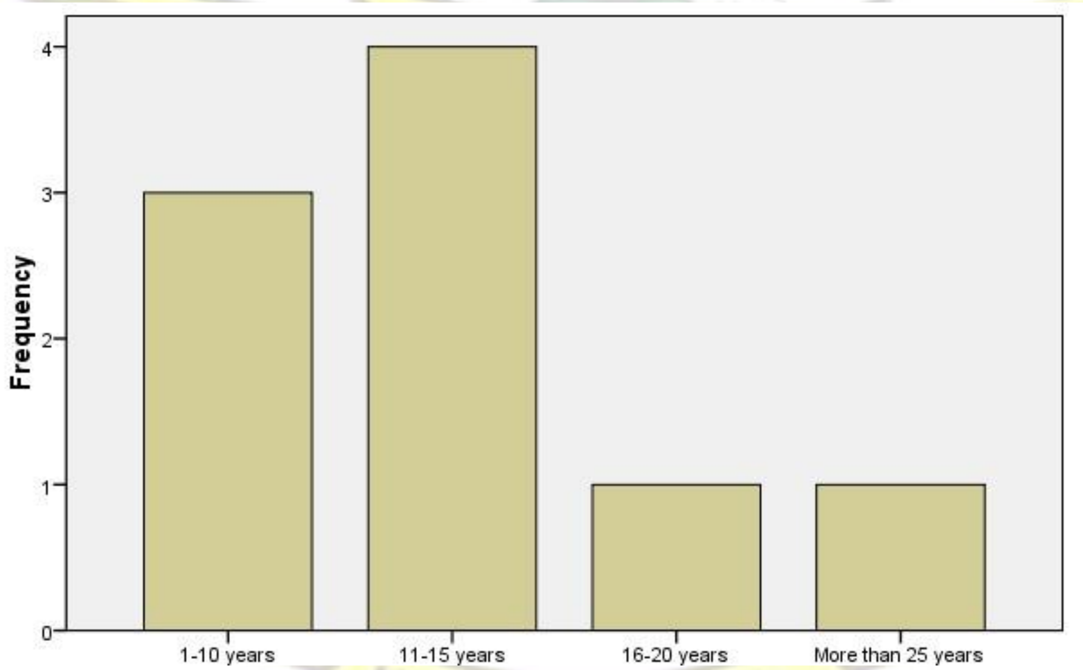

Fig. 6.39 Average term for mortgages

6.4.6.2 Amount of mortgage credit offered by banks to contractors

On whether banks provided 100% mortgages, 30% of the respondents offered 100% mortgages whilst 70% would only offer mortgages after a down payment by the client (fig.6.40).

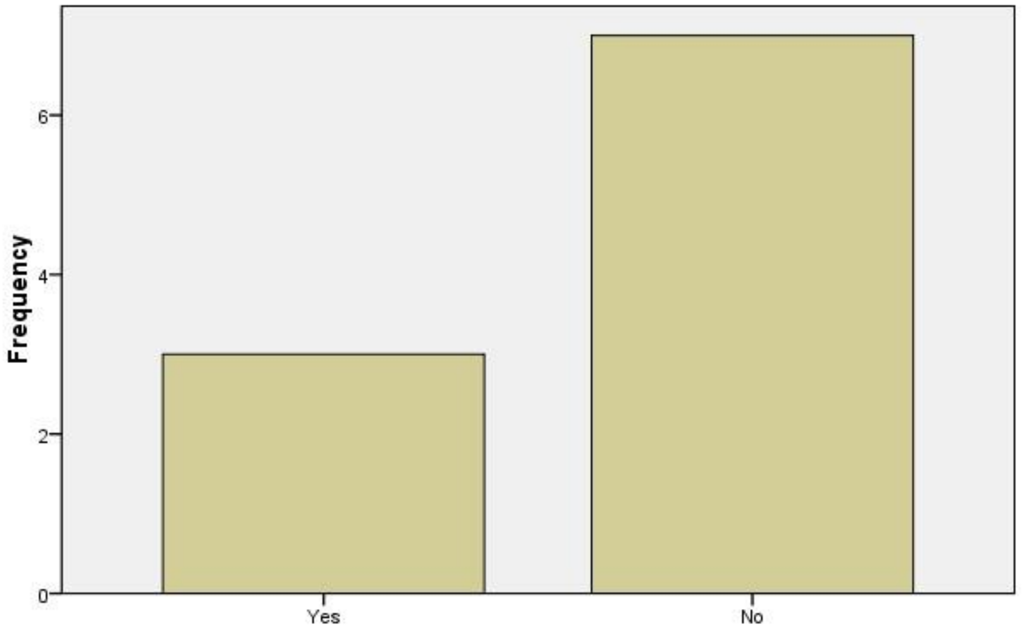

Fig 6.40 Banks that offer 100% mortgages

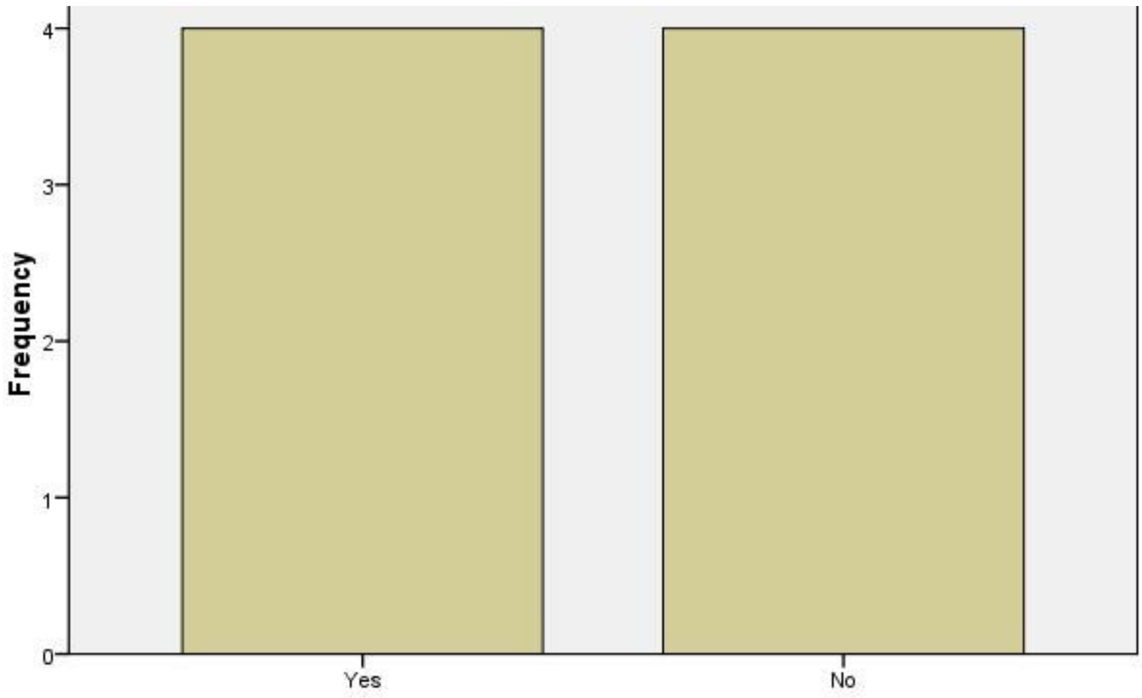

Fig 6.41 Firms which will offer 100% mortgages if it boosts their cashflow

6.4.7 Bank preferences in terms of projects supported

Lastly the project-types favoured by banks for financing are explored. Respondents were asked to choose from a list of 5 options which project types they would most likely finance.

On a scale of 1 to 5, respondents were asked to rate the factors: "government funded projects, projects for private sector corporate clients, real estate projects with advance contributions by the clients, contractor initiated speculative projects and Build-operate-transfer (BOT) style projects. Selected by some 73% of respondent banks, the most popular type of project preferred by respondent banks for financing is "projects for private sector corporate clients".

This is due largely to the fact that private sector clients in most cases have reliable sources of financing for projects from which payments are made. Projects funded by private sector clients offer some assurance to banks that funds lent to contractors will be repaid if contractors get paid promptly.

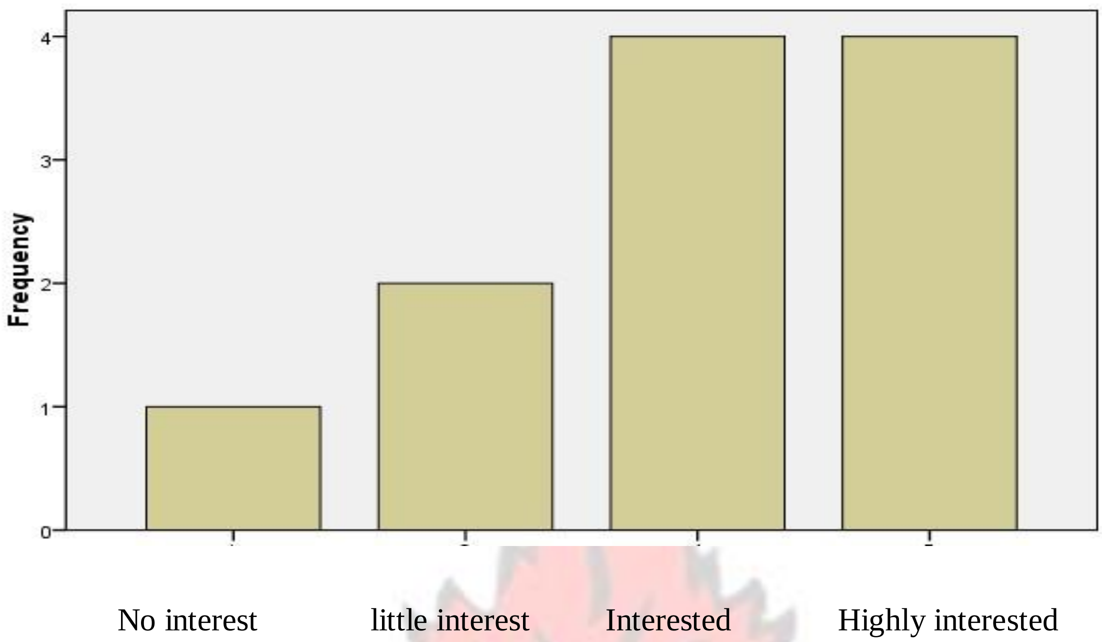

Fig 6.42 Banks' preferred project types for financing: Corporate sector clients

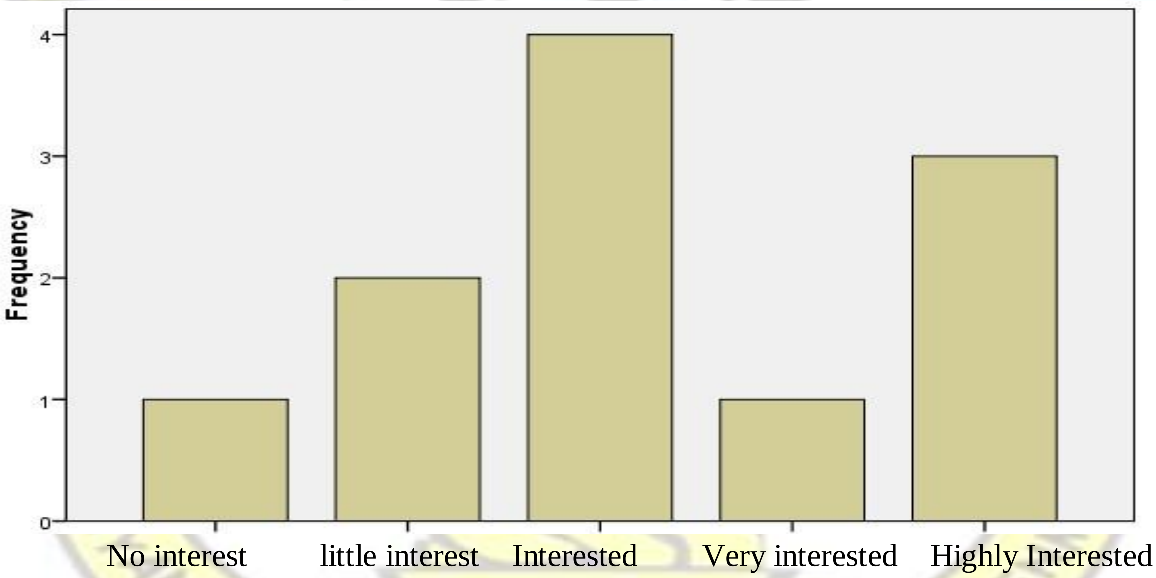

Fig. 6.43 Banks' preferred project types for financing: Government funded projects

In the case of government funded projects, although there appears to be an even spread overall of banks who prefer to finance government funded projects and those who are not interested in such projects, the trend is skewed in the direction of those who have a stronger preference for government funded projects (fig. 6.43). Despite the disincentives presented by long payment delays associated with government funded projects, the surprising interest amongst banks to finance such project types could be due to the guarantees associated with such projects in the understanding that however long it takes, payments.

The survey also shows some interest amongst banks to finance real estate projects which are constructed with advance contribution by customers. Nearly half of the valid responses show a preference for financing this type of projects. However, this is matched by an almost equal number of banks which do not offer support for this project type. Whilst this approach reduces the exposure of banks with much of the financial risk borne by the customer, the evidence here does not suggest strongly that more banks offer support for real estate projects which are financed using funds advanced by the customers than those who do not (fig.5.44).

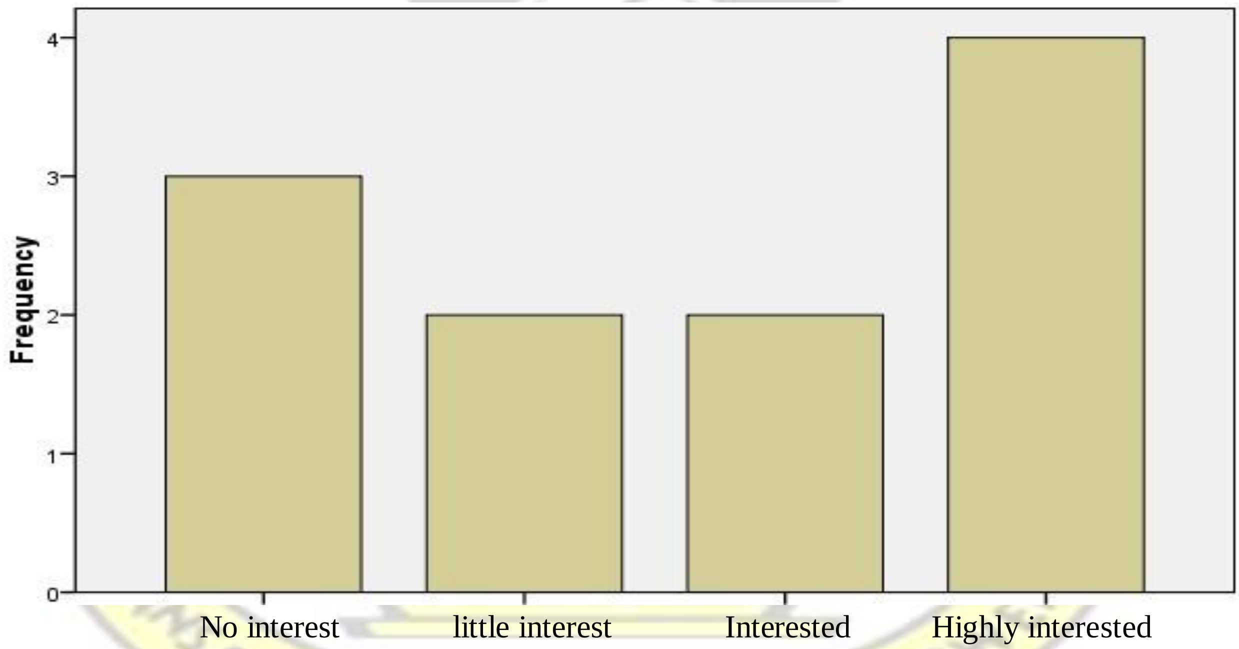

Fig. 6.44 Banks' preferred project types for financing: Client pre-financed Real estate projects

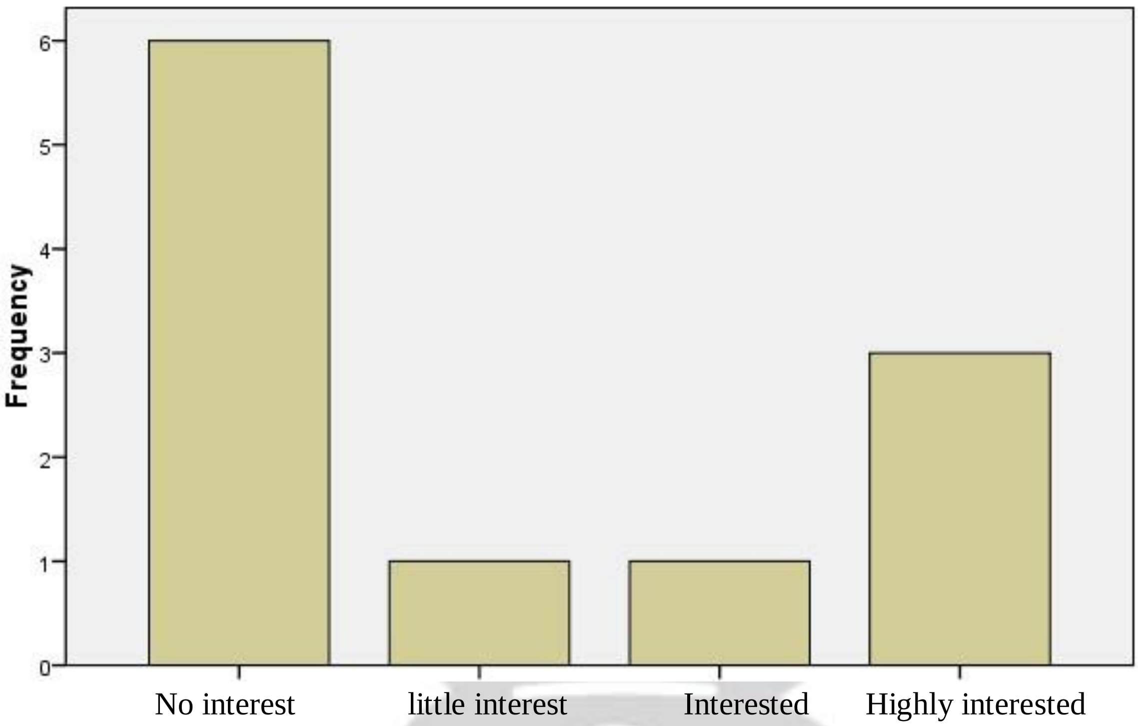

Fig 6.45 Banks' preferred project types for financing: Speculative projects

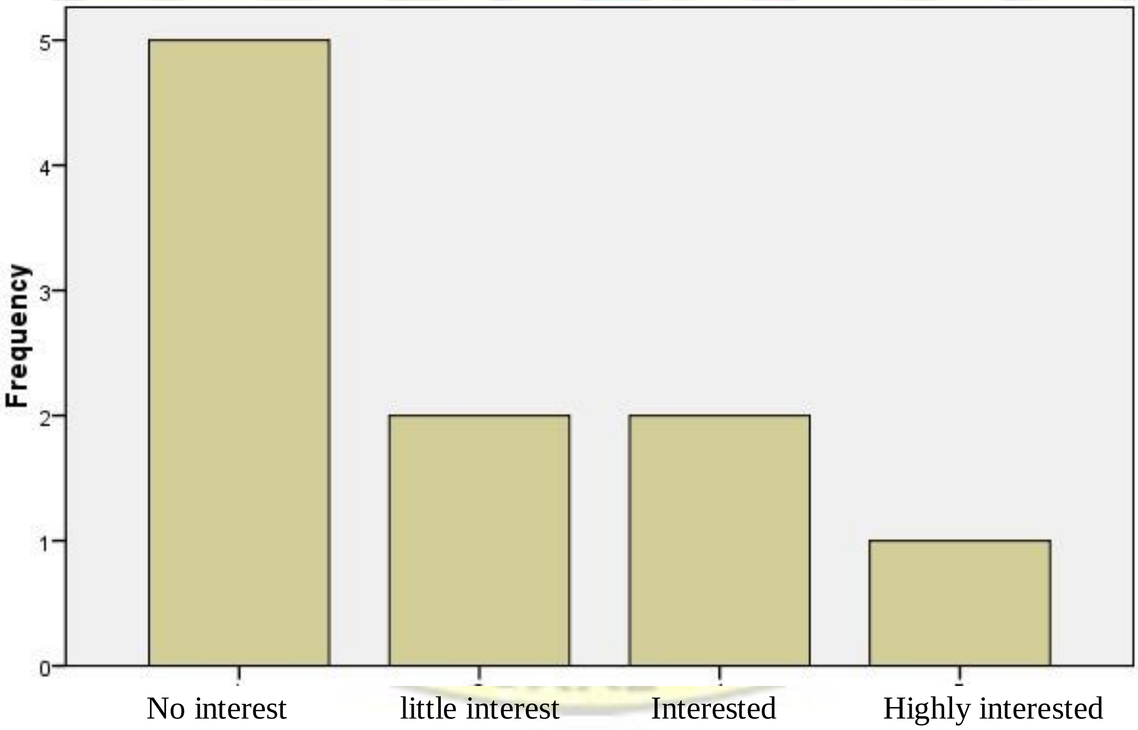

Fig 6.46 Banks' preferred projects for financing: Build-operate-transfer (BOT)

Speculative projects refer to projects initiated by the contractor without an indication from potential clients about existing demand for the products to be developed. The evidence from the survey shows that nearly two times as many banks are not interested in speculative projects as those who prefer to finance speculative projects (fig. 6.46). The apparent lack of interest in speculative projects by banks may be the result of lack of certainty that property when completed will sell which is associated with developments in this category.

The survey results indicate that bank preferences amongst the different project types showed "Build-Operate-Transfer" (BOT) – type projects as the least preferred by banks for financing support. The apparent lack of interest in BOT-type projects by Ghanaian banks may be the result of low awareness and a lack of understanding of the BOT concept. With contractors required to fund the entire project before they have an opportunity to recoup their investment through user charges etc., banks may be concerned by the increased exposure to risk. The public-private partnership (PPP) type BOT projects such as Private Finance Initiative (PFI) projects largely used in the UK for procuring public services offsets the increased risk through the public sector‟s contribution. The low ranking of BOT type projects could be due to a lack of awareness of the processes involved and potential benefits associate with such projects which can be addressed through increased education.

6.4.8 Most prominent reasons why banks do not finance contractors

All 7 factors are deemed to be relevant reasons why banks do not support contractors. The reasons offered by banks as the most important were explored using factor analysis. This analysis does not preclude the value of the other factors but demonstrates which of these are seen by the banks as most prominent.

Using the scree plot diagram, the curve does not clearly illustrate the point where the curve becomes horizontal or nearly horizontal (fig. 6.47). This confirms the position that all the factors are relevant and need to be considered. However using the latent root approach, there are three factors with eigenvalues more than 1 which means 3 components have to be extracted. From the rotated component matrix, the 3 components are:

1. Contractors lack the personnel to manage projects;
2. Profit margins for projects are low;
3. Government does not pay contractors on time.

This however does not imply that the other factors are less relevant where they occur but that they are more frequently cited by banks as the reason for not supporting contractors.

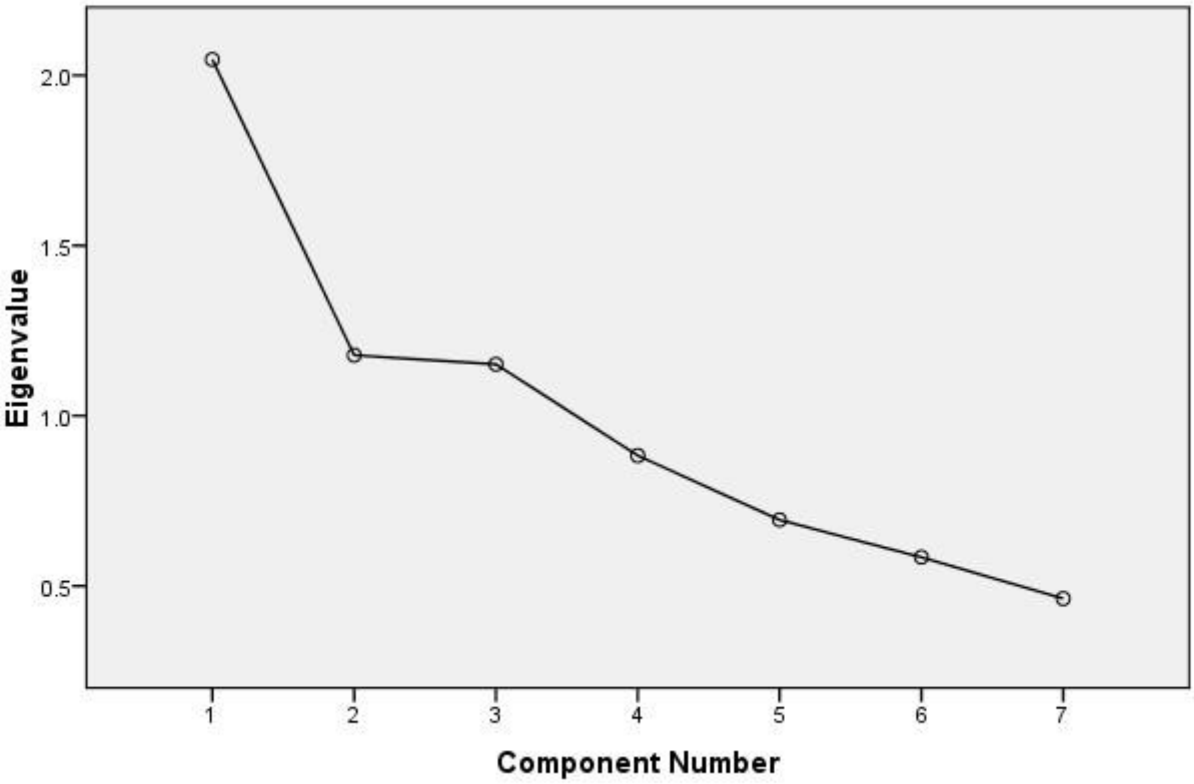

Fig. 6.47 Scree Plot: Most prominent reasons why banks do not finance contractors

Table 6.14 Total variance explained: Reasons why banks do not finance contractors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.047	29.238	29.238	2.047	29.238	29.238	1.617	23.107	23.107
2	1.178	16.829	46.068	1.178	16.829	46.068	1.599	22.849	45.956
3	1.151	16.447	62.514	1.151	16.447	62.514	1.159	16.559	62.514
4	.883	12.614	75.129						
5	.694	9.914	85.043						
6	.584	8.347	93.389						
7	.463	6.611	100.000						

Extraction Method: Principal Component Analysis.

Table 6.15 Rotated Component Matrix[a] Reasons why banks do not finance contractors

	Component		
	1	2	3
Factors-Lack collateral	.153	.678	.080
Factors- Do not pay back contracted loans	.636	.266	.200
Factors-Interest rate are too high	-.210	.521	-.586
Factors-Bank loans are not suitable for construction	.694	.225	-.351
Factors-Profit margins are low	.200	.809	.071
Factors-Government does not pay contractors on time	-.077	.301	.800
Factors-Lack the personnel to successfully manage projects funded with loans	.787	-.025	.040

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

6.5 Critical Success Factors (CSFs) For Improving Performance

The CSFs developed in this study have been developed through a systematic review of primary and secondary literature related to the subject. In the process, previous research, literature on existing programmes, models and frameworks commonly used for improving performance were compared. The review was not restricted to the Construction Industry but was a multi-sector review of best practice across a broad range of disciplines. The comparisons highlighted the most common critical success factors.

To develop the critical success factors, the respective factors identified in the various literature, models, frameworks and programmes for improving performance were scored and ranked. The most commonly used success factors usually credited for yielding improved business performance were identified. Only the factors which appeared at least five (5) times in the literature reviewed were considered. This ensured that only the most popular factors were included. Amongst those considered, some were combined where they shared similar characteristics. Appendix 1 show the models and publications reviewed and their respective success factors. Table 16 presents the 16 most common success factors (those featured at least five times in Appendix 1 which have been scored and ranked. Using Factor Analysis, the 16 factors are analysed and reduced to 8. This shows which of the 16 factors are most important relative to the Ghanaian context.

In developing the CSFs as part of this study, the literature reviewed covered a broad range of industries and business sectors over a long period of time. This ensured that the critical success factors developed in this research drew on the experiences of a wide range of industry sectors over a reasonable term. This allows for any inconsistencies and distortions attributable to particular sources to be addressed. Also the most popular international and national quality awards have been reviewed drawing on the relative synergies of the different awards. These include the EFQM for Europe, Baldridge Award for the United States and the Deming Award in Japan. In addition to these, popular management techniques and models for improving performance such as Six Sigma, the Xerox Model, and the McKinsey 7-S Model have been reviewed as part of this study.

Table 16 Most popular CSFs ranked and scored

Frequency of occurrence of critical success factors (CSFs) and ranks				
Critical Success Factors (CSFs)	**Frequency**	**Rank**	**CSFs in Rank Order**	**Rank**
Leadership and vision	24	1	Leadership and vision	**1**
Customer focus	14	6	Lean principles / Continuous improvement	**2**
Strategy	11	9	People / HRM	**2**
Measurement / Information and analysis / Knowledge management	15	5	Management of processes	**4**
Partnerships and Management of suppliers	13	7	Measurement / Information and analysis / Knowledge management	**5**
People / HRM	20	2	Customer focus	**6**
Management of resources	5	16	Partnerships and Management of suppliers	**7**
Technology	8	10	Quality / Zero defects	**8**
Results	8	10	Strategy	**9**
Work culture and environment	7	12	Technology	**10**
Management of processes	16	4	Results	**10**

Innovation and Creativity	6	14	Organisational design	12
Teamwork	6	14	Work culture and environment	**12**
Quality / Zero defects	12	8	Innovation and Creativity	**14**
Organisational design	7	12	Teamwork	**14**
Lean principles / Continuous improvement	20	2	Management of resources	**16**

The relative scores and ranks of factors gives an indication of which of the factors are most popular in the literature and the models reviewed. This however gives no indication of the relative effectiveness of the factors which will be the subject of future research.

In this study, sixteen (16) best practices in business are identified as the critical success factors (CSFs) which enable business excellence. These are listed and ranked based on the frequency of their occurrence in literature and in existing models and programmes which were reviewed as part of the study.

It is proposed that Ghanaian contractors can use the CSFs to improve their performance. This can be done by comparing their performance with the performance of industry leaders in selected CSFs. Attaining world-class construction performance is a progressive effort which can start with the implementation of one or multiple CSFs at a time. Organisations with little or no experience of benchmarking may start with one at a time whilst more experienced organisations may be able to implement several or all the CSFs at a time.

In rank order, the 16 CSFs are:

1. Leadership and vision
2. Lean principles / Continuous improvement
3. People / HRM

4. Management of processes
5. Measurement / Information and analysis / Knowledge management
6. Customer focus
7. Partnerships and Management of suppliers
8. Quality / Zero defects
9. Strategy
10. Technology
11. Results
12. Organisational design
13. Work culture and environment
14. Innovation and Creativity
15. Teamwork
16. Management of resources

6.6 Factor Analysis of CSFs

Evaluation of Reliability and Validity Measuring Instrument

The concept of developing a measuring instrument in quality management research can be used to confirm the abstract constructs in models and frameworks (Bassioni, 2007). Reliability and validity are important considerations in the evaluation of the characteristics of a questionnaire.

6.6.1 Reliability of measuring instrument

Reliability indicates whether a particular technique applied to the same object will yield the same result each time. It is the quality of measurement method which determines whether the same data would have been collected each time if the phenomenon is repeated (Babbie, 2007).

It provides an assessment of the degree of consistency between multiple measures of a variable (Hair et al., 2006).

Babbie (2007) suggests three approaches to establishing reliability. These are the Test-Retest Method, the Split-Half Method and using established measures. The Test-Retest Method may be used in addition to the use of Cronbach Alpha as a means to establishing reliability (Hair et al., 2006). Bassioni (2007) uses Cronbach Alpha as a measure of internal consistency and reliability. The use of Cronbach Alpha using SPSS provides a simplified approach to determining reliability of measuring instrument and is the approach adopted in this study. The generally agreed lower limit for Cronbach‟s Alpha is 0.70 which may decrease to 0.60 in exploratory research. In general, reliability increases with an increase in the number of items (Hair et al., 2006).

The alpha coefficient for the 16 CSFs is .893 (table 6.17), suggesting that the items have relatively high internal consistency. Generally a reliability coefficient of 0.70or higher is considered "acceptable" in most social science research situations.)

Table 6.17 Reliability Statistics for 16 CSFs

Cronbach's Alpha	N of Items
.893	16

6.6.2 Validity

Validity gives an indication of the certainty of the instrument in actually measuring the concepts it is intended to measure (Bassioni, 2007). It is used to refer to the extent to which an empirical measure adequately reflects the real meaning of a concept under consideration. The ultimate validity of a measure is difficult to prove, relative validity can be determined using the measures: face validity, content validity, criterion validity, content validity, construct validity, internal validity and external validation (Babbie, 2007).

Bassioni (2007) demonstrates content validity in the instrument used in two ways. First, the "analysis of the target domain" was achieved through the literature review conducted and the theoretical development of the model based on well-established models. The second approach to content validity was achieved through "expert judgement" was based on the empirical evaluation of expert interviews and case studies and the evaluation of the questionnaire in a pilot study. In this study, content validity has been established through the literature review a theoretical development of a benchmarking framework based on existing research and established models. The factor analysis of CSFs supports the findings from literature. 5 of the 8 CSFs found to be most relevant to Ghanaian contractors from the factor analysis appear in the top 8 of the 16 CSFs identified from literature.

External validation has been demonstrated in this study by testing the key research deliverables – the benchmarking framework, the benchmarking implementation model and the performance measuring tool – with Ghanaian contractors who did not participate in the original study. To ensure the general applicability of these tools across different contractor categories, the tools were tested by all classes of Ghanaian contractors. The findings of the validation process are reported in a separate section of this report.

The Kaiser – Meyer –Olkin (KMO) Measure of Sampling Adequacy (MSA) shows the appropriateness of using factor analysis. The overall MSA value should be above 0.5 for factor analysis to be appropriate. From table 6.18, The KMO MSA of 0.799 shows that factor analysis is a suitable method for the purposes of this survey. Again the observed significance level for the Bartlett‟s Test of Sphericity is .0000. This is small enough to reject the null hypothesis that the variables in a population correlation matrix are uncorrelated. It is concluded that the strength of the relationship among variables is strong. It is a good idea to proceed with factor analysis for the data.

6.6.3 Determination of appropriateness of factor analysis for this study

Table 6.18 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.799
Bartlett's Test of Sphericity	Approx. Chi-Square	584.867
	Df	120
	Sig.	.000

6.6.4 Extraction of factors

Table 6.19 Total variances

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.625	41.403	41.403	6.625	41.403	41.403	3.556	22.224	22.224
2	1.856	11.598	53.002	1.856	11.598	53.002	3.078	19.241	41.464
3	1.305	8.158	61.159 67.838	1.305	8.158	61.159	3.024	18.899	60.364
4	1.069	6.678	73.203	1.069	6.678	67.838	1.196	7.474	67.838
5	.858	5.365	78.147						
6	.791	4.944	82.051 85.389						
7	.625	3.904	88.534						
8	.534	3.339	91.072 93.277						
9	.503	3.145	95.339						
10	.406	2.538	96.832						

11	.353	2.205	98.247						
12	.330	2.062	99.367						
13	.239	1.494	100.000						
14	.226	1.415							
15	.179	1.120							
16	.101	.633							

Extraction Method: Principal Component Analysis.

The latent root (eigenvalues) approach to selection of factors recommends the selection of four factors whose eigenvalues are more than 1. Although it is suggested in the literature reviewed that CSFs may generally be between 4 and 8, the 4 CSFs as shown in table 6.19 were considered to be inadequate within the context of the reviewed literature. This confirms that the eigenvalues approach is recommended where the number of variables to be reduced was between 20 and 50 and that for variables less than 20, there was a tendency for this approach to extract too few factors (Hair et al., 2006). The scree plot approach is therefore used to identify the optimum number of factors that can be extracted before the unique variance begins to dominate the common variance structure. It is derived by plotting the latent roots against the number of factors in their order of extraction. The point at which the curve first begins to straighten out is considered to be the maximum number of factors to extract. From the scree plot, the first 9 factors would qualify because beyond 9 factors, a large population of unique variance would be included and thus, the factors will not be acceptable if the latent root criterion, only 4 factors would have been considered. Using the scree plot test provides 5 more factors. The scree plot approach recommends a possible 9 factors as being suitable for the purposes of the analysis.

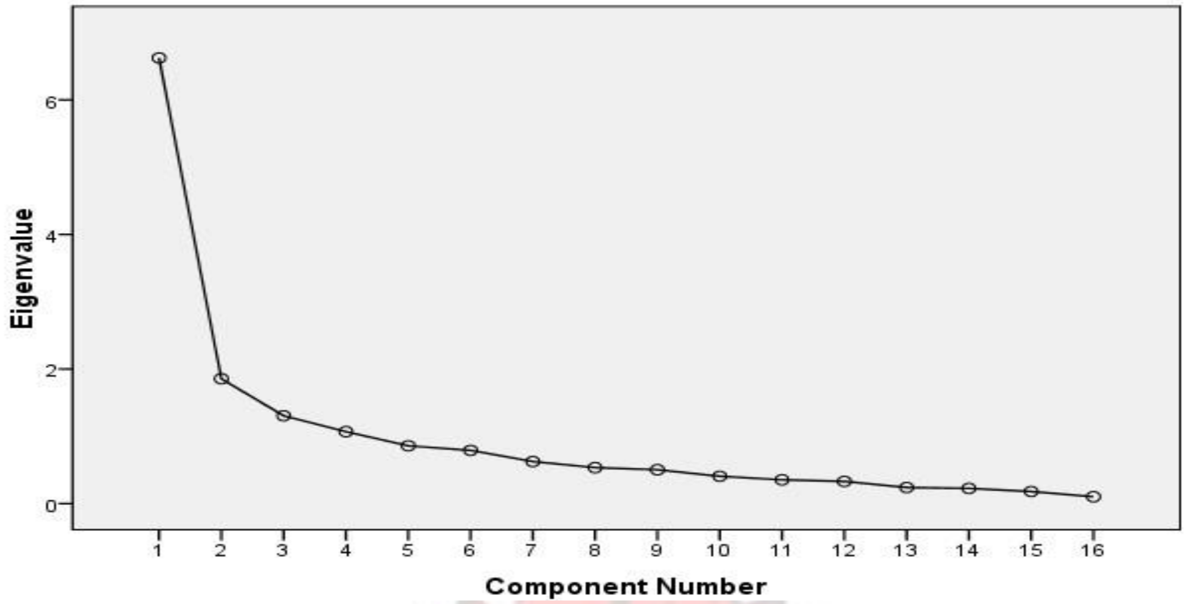

Fig 6.48 Scree Plot for CSFs

The 9 factors suggested by the point where the curve appears to go parallel to the component axis not only falls outside the 4 to 8 factor range target set from the literature review for this study but also the factor loading for the 9th factor – 0.534 is deemed too small as against the generally recommended minimum of 0.7 and thus the 9th factor is dropped.

SPSS is used and instructed to extract 8 factors. Table 6.20 shows the 8 factors extracted and their eigenvalues. Two of the 8 factors have their eigenvalues less than 0.7 which is perceived by some to be a general guide of what is acceptable. However they are both greater than 0.4, below which factor loadings are regarded too low and should be discarded.

Table 6.20 Total variance explained for CSFs

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.625	41.403	41.403	6.625	41.403	41.403	2.514	15.715	15.715
2	1.856	11.598	53.002	1.856	11.598	53.002	2.202	13.760	29.474
3	1.305	8.158	61.159	1.305	8.158	61.159	2.125	13.279	42.754

4	1.069	6.678	67.838	1.069	6.678	67.838	1.961	12.253	55.007
5	.858	5.365	73.203	.858	5.365	73.203	1.683	10.520	65.527
6	.791	4.944	78.147	.791	4.944	78.147	1.327	8.294	73.821
7	.625	3.904	82.051	.625	3.904	82.051	1.110	6.939	80.760
8	.534	3.339	85.389	.534	3.339	85.389	.741	4.629	85.389
9	.503	3.145	88.534						
10	.406	2.538	91.072						
11	.353	2.205	93.277						
12	.330	2.062	95.339						
13	.239	1.494	96.832						
14	.226	1.415	98.247						
15	.179	1.120	99.367						
16	.101	.633	100.000						

Extraction Method: Principal Component Analysis.

Table 6.21 Communalities

	Initial	Extraction
Effectiveness of Leadership and vision	1.000	.848
Implementation of lean principles	1.000	.868
Motivation and involvement of people	1.000	.798
Effectiveness of management processes	1.000	.805
Measurement, analysis and management	1.000	.855
		.915

A focus on customer/clients satisfaction	1.000	
Effective partnerships with suppliers	1.000	.885
Quality/zero defects culture	1.000	.961
Effective strategy	1.000	.815
Technology	1.000	.910
A focus on results	1.000	.787
Organisational design	1.000	.902
Developing a work culture and environment	1.000	.846
Promotion and the integration of innovation and creativity	1.000	.772
Promoting teamwork	1.000	.833
Management of resources	1.000	.863

Extraction Method: Principal Component Analysis.

Table 6.22 Component Matrix for CSFs

Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
Effectiveness of Leadership and vision	.531	.195	.480	-.477	.111	.217	-.101	-.004
Implementation of lean principles	.626	-.476	.273	.120	.018	.170	.207	-.299
Motivation and involvement of people	.567	-.429	.028	-.218	.090	.485	-.032	.018

Effectiveness of management processes	.654	-.320	.105	-.319	.087	-.313	-.170	.167
Measurement, analysis and management	.771	-.100	.203	-.115	-.107	-.271	-.098	-.319
A focus on customer/clients satisfaction	.450	.693	-.047	-.185	.375	.045	.220	-.073
Effective partnerships with suppliers	.733	.239	-.099	-.172	.160	-.350	.321	-.015
Quality/zero defects culture	.113	-.025	.592	.630	.411	-.153	-.089	-.015
Effective strategy	.637	-.391	.180	.094	-.204	-.114	.209	.343
Technology	.689	-.256	-.395	.239	.103	.189	.331	-.026
A focus on results	.749	-.027	-.425	.132	.051	-.109	-.110	-.035
Organisational design	.656	-.004	-.378	.134	.386	.087	-.375	.115
Developing a work culture and environment	.555	.502	-.012	.244	-.385	.115	-.110	-.229
Promotion and the integration of innovation and creativity	.828	.065	-.023	.067	-.149	.090	-.214	-.025
Promoting teamwork	.836	.087	-.041	.039	-.305	-.146	-.042	.090
Management of resources	.540	.523	.267	.191	-.127	.225	.083	.339

Extraction Method: Principal Component Analysis.

a. 8 components extracted.

Table 6.21 below shows the communalities for the respective variables. The high communality values show that a large amount of variance in the respective variables has been extracted by the factor solutions. All of the communalities are sufficiently high to proceed with the rotation of the factor matrix.

Table 6.23 Rotated Component Matrix for CSFs

Rotated Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
Effectiveness of Leadership and								

vision	.239	.177	.105	-.010	.276	.814	.035	.087
Implementation of lean principles	.310	.166	.798	.026	-.011	.184	.242	-.116
Motivation and involvement of people	.161	-.016	.644	.322	-.102	.465	-.141	.086
Effectiveness of management processes	.772	-.046	.145	.301	.058	.299	.001	-.040
Measurement, analysis and management	.621	.431	.282	.120	.177	.246	.123	-.287
A focus on customer/clients satisfaction	-.085	.2 25	-.059	.187	.861	.259	.012	.101
Effective partnerships with suppliers	.518	.198	.163	.186	.717	.008	-.032	.029
Quality/zero defects culture	.032	.016	.055	.022	-.005	.007	.976	.063
Effective strategy	.664	.100	.453	.058	-.068	-.009	.086	.378
Technology	.166	.147	.721	.453	.247	-.225	-.080	.136
A focus on results	.354	.339	.263	.635	.225	-.128	-.078	-.035
Organisational design	.149	.135	.139	.894	.156	.106	.078	.037
Developing a work culture and environment	.011	.885	.049	.122	.194	.050	.010	.079
Promotion and the integration of innovation and creativity	.359	.566	.269	.423	.091	.233	.013	.097
Promoting teamwork	.571	.570	.200	.269	.166	.055	-.065	.186

Extraction Method: Principal Component Analysis. Management of resources .064 .522 .022 .069 .303 .242 .179 .632 Rotation Method: Varimax with Kaiser Normalization.

a. Rotation Converged in 15 iterations.

The Component Matrix shown in table 6.22 shows the results of the factor loadings for the extracted factors. The Rotated Component Matrix in table 6.23 shows a better structure for the extracted factors. From the Rotated Component Matrix, each of the variables has a significant factor loading on only one factor except for "Promotion of Teamwork" which has a factor loading of 0.571 on factor 1 and a loading of 0.570 in factor 2. It was decided that the variable should be deleted to eliminate the cross-loading.

Table 6.24 Rotated Component Matrix[a] with "Teamwork" deleted

	Component							
	1	2	3	4	5	6	7	8
Effectiveness of Leadership and vision	.002	.144	.190	.259	.249	.806	.075	.017
Implementation of lean principles	.027	.770	.112	.381	-.004	.068	.205	.230
Motivation and involvement of people	.289	.738	-.038	.096	-.055	.405	.077	-.109
Effectiveness of management processes	.348	.168	-.158	.620	.097	.323	.326	-.007
Measurement, analysis and management	.166	.267	.297	.782	.152	.156	.131	.077
A focus on customer/clients satisfaction	.171	-.032	.270	-.018	.844	.259	-.163	.019
Effective partnerships with suppliers	.232	.124	.132	.430	.741	.030	.241	-.036

Quality/zero defects culture	.012	.040	.036	.043	-.002	.008	.043	.982
Effective strategy	.153	.307	.117	.287	-.023	.090	.823	.063
Technology	.462	.669	.136	.037	.291	-.253	.275	-.061
A focus on results	.682	.211	.271	.322	.221	-.138	.195	-.099
Organisational design	.904	.152	.110	.096	.150	.116	.034	.077
Developing a work culture and environment	.154	.041	.884	.174	.162	.011	-.022	-.020
Promotion and the integration of innovation and creativity	.458	.309	.497	.337	.113	.222	.144	.013
Management of resources	.102	.020	.645	-.165	.343	.352	.323	.193

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 6.24 Rotated Component Matrix[a] with "Teamwork" deleted

	Component							
	1	2	3	4	5	6	7	8
Effectiveness of Leadership and vision	.002	.144	.190	.259	.249	.806	.075	.017
Implementation of lean principles				.381	-.004	.068	.205	.230

	.027	.770	.112						
Motivation and involvement of people				.096	-.055	.405	.077	-.109
	.289	.738	-.038					
				.620	.097	.323	.326	-.007
Effectiveness of management processes	.348	.168	-.158					
				.782				
Measurement, analysis and management					.152	.156	.131	.077
	.166	.267	.297					
A focus on customer/clients satisfaction				-.018				
					.844	.259	-.163	.019
	.171	-.032	.270					
Effective partnerships with suppliers				.430	.741	.030	.241	-.036
	.232	.124	.132					
Quality/zero defects culture				.043	-.002	.008	.043	.982
	.012	.040	.036					
Effective strategy				.287	-.023	.090	.823	.063
	.153	.307	.117					
Technology				.037	.291	-.253	.275	-.061
	.462	.669	.136					
A focus on results				.322	.221	-.138	.195	-.099
	.682	.211	.271					
Organisational design				.096	.150	.116	.034	.077
	.904	.152	.110					
				.174	.162	.011	-.022	-.020

Developing a work culture and environment	.154	.041	.884					
Promotion and the integration of innovation and creativity	.458	.309	.497	.337	.113	.222	.144	.013
Management of resources	.102	.020	.645	-.165	.343	.352	.323	.193

a. Rotation converged in 13 iterations.

From table 6.24, the extracted factors are the respective factors with the highest factor loadings under the respective components in the Rotated Component Matrix.

From the original list of 16 CSFs, the 8 variables extracted from the factor analysis are:

1. Quality and zero defects culture
2. Organisational design
3. Work culture and work environment
4. Client satisfaction
5. Strategy
6. Leadership
7. Measurement, analysis of information and knowledge management
8. Implementation of Lean Principles

These variables represent the CSFs considered to be most relevant to Ghanaian contractors by the contractors surveyed in this study. In order to achieve performance excellence, Ghanaian contractors should aim to improve their performance in these CSFs. Whilst taking the relevant actions to improve in these CSFs, they should continually measure their performance in these CSFs and benchmark against best-in-class organisations using the CSFs.

Whilst there are other factors which also can help organisations achieve varying degrees of success, the CSFs proposed in this study represent a checklist for organisations new to benchmarking such as the majority of Ghanaian construction firms. For such organisations, this is a useful first step to the ultimate attainment of business excellence.

The CSFs developed in this study integrate the success criteria used by the most popular national and international quality awards such as the EFQM, MBNQA, the Deming Prize as well as the main criteria set out in literature on World-class Manufacturing. It can thus be deduced that excelling in these criteria is critical to performance improvement.

The CSFs in themselves will not automatically lead to improved performance but are a means to an end. Firstly, they highlight the areas that organisations seeking to improve their performance must focus their efforts and seek to improve. The effective integration of these into the management and business practices of organisations will lead to internationally competitive performance.

The CSFs identified in this study can be used by Ghanaian contractors as the key targets for improving performance. In the case of Ghanaian contractors, the CSFs can be used as the criteria for:

i. Benchmarking their performance against the best-in class;

ii. Performance measurement; and iii. Setting targets for

improving their performance.

For the purposes of benchmarking, Ghanaian construction firms may choose from the list of CSFs in line with the vision set out by top management. Construction firms new to benchmarking or those with little experience of benchmarking may start with just a few CSFs at a time. It is recommended that not more than four (4) CSFs be selected for benchmarking at a time.

The set of eight (8) CSFs developed in this study are incorporated into the Benchmarking Framework and Implementation Model developed also developed in this study. This simplifies the process of identifying what to benchmark by providing a set of ready options from which organisations may choose.

6.12 KEY PERFORMANCE INDICATORS (KPIS)

The set of KPIs for Ghanaian contractors developed in this research has been developed through an extensive review of existing KPIs from different sectors including several from the different sectors of the construction industry. These were obtained through a review of relevant literature. Generally, it was observed that there are several commonalities amongst the performance measures used in the different literature and the existing KPIs. Whilst some are broken down into the specific performance measures and indicators, others are expressed as broad groupings of similar measures.

In keeping with the trend observed in the set of KPIs developed by *Constructing Excellence* for the UK construction industry, the Scottish Construction Centre"s KPIs for the Scottish Construction Industry, the Rethinking Construction KPIs and the KPI Working Group"s KPIs, the KPIs developed in this study for Ghanaian contractors is a KPI Framework covering the most commonly used groups. The Ghanaian contractors" KPI Framework covers all the major KPI categories which from the literature reviewed are relevant both for building and road contractors. Using groups instead of the individual measures presents a simplified approach to using the KPIs for measuring performance and for benchmarking, especially for organisations with little or no experience of benchmarking. Egan (1998) argued that the use of performance indicators by the construction industry can lead to dramatic improvements in performance. Using proposed KPIs for Ghanaian contractors could be the logical first step by contractors to achieving the desired improvements required to attain internationally competitive levels.

In developing the Ghanaian contractor KPIs, 21 sets of KPIs drawn from a broad range of industries including the construction industry were reviewed (Appendix 3). The ten most common occurring KPIs deemed to be most relevant for construction were selected for Ghanaian contractors. These are:

1. Client satisfaction
2. Cost
3. Time
4. Quality
5. Health and safety
6. Business performance
7. Productivity
8. Predictability
9. People
10. Environment

These KPI groups can be used by Ghanaian contractors as the basis for:

i. Benchmarking performance against the best-in-class organisations; ii. Measuring performance; and iii. Setting targets for improving their performance to internationally competitive levels.

As a benchmarking tool, the KPI groups are incorporated into the Conceptual Benchmarking Framework developed for Ghanaian contractors shown in Fig 4.1(Ofori-Kuragu and Baiden, 2008) in line with the objectives of this study.

As a performance measurement tool, the KPIs developed can be used by third party groups such as potential clients as the criteria for assessing the performance of Ghanaian contractors. It provides a basis for comparing the performance of Ghanaian contractors with best-in-class contractors. As part of general improvement efforts, the KPIs present a set of criteria which Ghanaian contractors can select from for targeted improvement.

6.12.1 Factor analysis of Ghanaian contractor KPIs

Developed from a compilation and comparison of existing KPIs, the KPIs for Ghanaian contractors were adapted to the Ghanaian construction industry using the results of a field survey of Ghanaian contractors. In the survey, Ghanaian contractors were asked during the survey to identify the KPIs most relevant to the Ghanaian industry. The responses obtained from the survey of D_1D_2 were analysed using factor analysis. The results of the factor analysis are present below.

6.12.1.1 Tests for Reliability of measuring instrument for KPIs and Validity

The reliability of the measuring instrument is explored using factor analysis. The Cronbach alpha value of 0.936 (table 6.25) is large enough which demonstrates that the measuring instrument is reliable.

Table 6.25 Reliability Statistics for KPIs

Cronbach's Alpha	N of Items
.936	10

KMO is used to show if factor analysis is a suitable method for analysis. The KMO value obtained from the analysis, .921 (table 6.24) is large enough and shows that factor analysis is an appropriate approach to analysis of the KPI data obtained from the survey.

Table 6.26 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.921
Bartlett's Test of Sphericity	Approx. Chi-Square	588.107
	Df	45
	Sig.	.000

6.12.1.2 Extraction of factors for KPIs

Using the Principal Component Approach, only two components have their eigenvalues more than 1. These account for a total cumulative variance of 77.61% (table 6.19). Going by his approach, only 2 factors should be extracted representing 2 KPIs. However 2 KPIs is too few and does not conform to the trend observed from literature in relation to the number of KPIs.

Table 6.27 Total Variance Explained – KPIs

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

1	6.379	63.794	63.794	6.379	63.794	63.794
2	1.381	13.813	77.607	1.381	13.813	77.607
3	.538	5.383	82.990			
4	.396	3.962	86.952			
5	.293	2.927	89.879			
6	.267	2.666	92.545			
7	.209	2.094	94.639			
8	.199	1.990	96.629			
9	.186	1.863	98.492			
10	.151	1.508	100.000			

Extraction Method: Principal Component Analysis.

A closer inspection of the scree plot for the KPIs suggests that 7 factors can be extracted (fig. 6.50). Factor analysis is used again this time with instruction for 7 factors to be extracted. From the rotated component matrix, the 7 factors extracted through factor analysis are: People, Client Satisfaction, Cost, Predictability, Quality, Health and Safety and Business Performance (table 6.27). The 3 measures of performance excluded from the initial list of 10 by the factor analysis are: Time, Productivity and Environment.

The KPIs developed in this study were originally identified from the literature study and have been adapted to the Ghanaian construction industry. Since the overall aim of the study is to enable world-class performance in Ghanaian contractors, the KPIs developed must be consistent with those used by the best-in-class organisations and in countries which have some of the best contractors. Whilst the seven (7) measures extracted using factor analysis are generally consistent with existing KPIs used in industry which were collected from literature, the exclusion of "Time" and "Productivity" from the list for Ghanaian contractors is not consistent with the general trends observed from literature. Many of the examples reviewed and used by the construction industries in the UK, USA and Denmark include "time" and "productivity". In order to bring the list of KPIs being developed with the leading countries mentioned in this section – UK, USA and Denmark, it was decided to add on "Time" and "Productivity" to the list developed for Ghanaian contractors.

In the case of "environment", whilst it is very popular with the older literature, especially for non-construction KPIs, trends in the UK construction industry KPIs underline its growing importance. The increasing awareness and demand amongst clients at the global level for sustainable construction products and carbon neutral construction. Whilst the level of awareness is low as shown by the preferences of the Ghanaian contractors shown by the survey, its relevance at the global level is not in doubt. This underscores the need for improved awareness amongst Ghanaian contractors on environmental issues. "Environment" is thus maintained amongst the Ghanaian contractor KPIs with the provision to take up the challenge of improving the awareness amongst Ghanaian contractors of environmental issues and the need for sustainable construction.

The final list of 10 KPIs for Ghanaian contractors are:

1. People;
2. Client Satisfaction;
3. Cost;
4. Predictability;
5. Quality;
6. Health & Safety;
7. Business Performance;
8. Time;
9. Productivity and

10. Environment

Whilst none of the original 10 KPIs has been excluded, the factor analysis has demonstrated the preferences of Ghanaian contractors as well as areas where additional attention is required to achieve well rounded improvements across all sectors of performance within the Ghanaian construction industry.

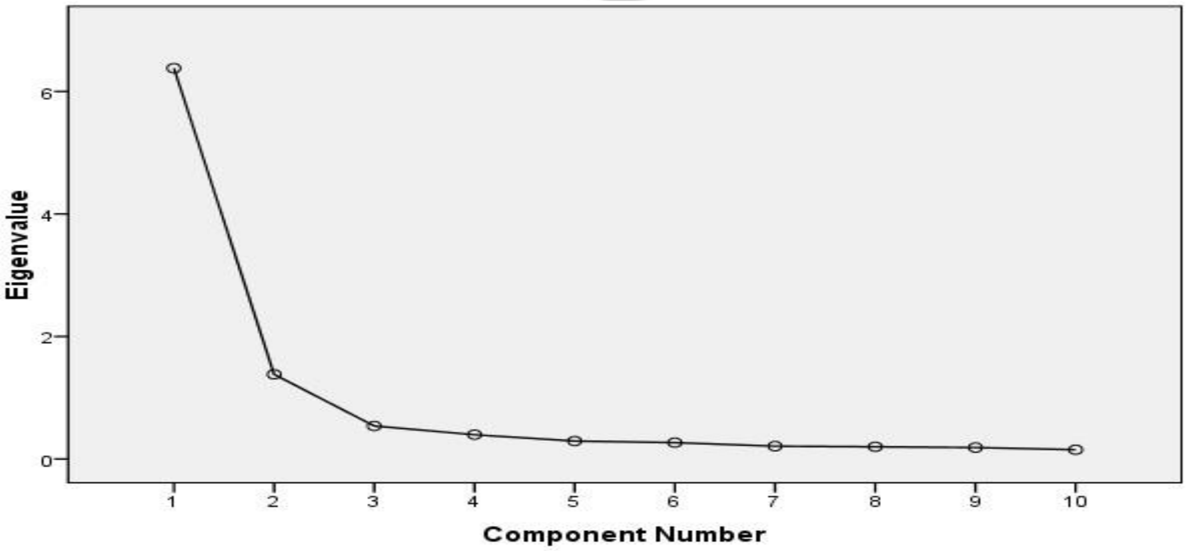

Fig 6.49 Scree Plot for KPIs

Table 6.28 Rotated Component Matrix[a] for KPIs

	Component						
	1	2	3	4	5	6	7
Performance-Client satisfaction	.129	.810	.314	.142	.280	.268	.180
Performance-Cost	.198	.326	.834	.190	.234	.147	.168
Performance-Time	.225	.510	.416	.227	.432	.388	.098
Performance-Quality	.189	.315	.250	.141	.808	.300	.150
Performance-Health and safety	.245	.283	.152	.168	.284	.838	.140

Performance-Business performance	.396	.194	.179	.288	.147	.150	.799
PerformanceProductivity	.479	.073	.277	.628	.237	.135	.357
Performance-Predictability	.499	.262	.165	.691	.100	.221	.233
Performance-People	.891	.103	.192	.197	.087	.116	.141
Performance-Environment	.839	.114	.057	.231	.168	.188	.234

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

6.13 BENCHMARKING FRAMEWORK & IMPLEMENTATION MODEL

Best-in-class firms from the leading industries have world-class operations and use best practices to produce world-class excellence in their performance. Cross-industry comparisons with best-in-class organisations help identify best practices and provide an understanding of the levels of performance associated with world-class performance. Cross industry comparisons between construction firms and leading global entities will identify the practices used by the best-in-class organisations and how such world-class organisations attain excellence. Benchmarking models provide a framework which enables such comparisons to be undertaken. However construction industry-specific methods for doing this are lacking. To be successful, the benchmarking framework proposed in this study should address the perceived weaknesses identified in the review. It should address the problems generally associated with benchmarking such as the high costs of implementing benchmarking programmes, problems with identifying suitable partners and the identification of what to benchmark amongst others. Benchmarking helps to identify the gaps in performance and the actions required to improve performance. The high costs associated with benchmarking means only the richest organisations are able to implement benchmarking programmes. It was an important consideration that the model developed for construction firms in this study is a cost-effective benchmarking model which guarantees a good return on the cost of implementation. The model integrates both the “process” or practices and results criteria representing the CSFs and KPIs respectively. In general terms, CSFs are the organisational or operational activities involved in any programme of improvement which have to succeed if the overall programme will be a success. In the context of benchmarking, they are the operational and organisational practices which must go well in order for a benchmarking programme to be successful.

In choosing which CSFs or KPIs to benchmark, attention should be paid to those which are most frequently used by most successful organisations. In the case of the CSFs, it is suggested that the number selected be between four and eight.

A framework consists of the logical steps involved in a process. The benchmarking framework developed in this research is a step-by-step presentation of the activities undertaken as part of the benchmarking process. It shows the most important factors responsible for business success (CSFs), and how these are related to the attainment of the characteristics associated with world-class organisations.

6.13.1 Benchmarking Framework for Ghanaian Contractors

The best-in-class companies have world-class operations and use best practices to produce world-class excellence in their performance. Cross-industry comparisons with best-in-class organisations help identify best practices and an understanding of the levels of performance associated with world-class performance. Cross industry comparisons between construction firms and leading global entities will identify the practices used by the best-in-class organisations and how such world-class organisations attain excellence. Benchmarking models provide a framework which enables such comparisons to be undertaken however construction industry-specific methods for doing this are lacking.

The characteristics of the construction industry make it unique justifying the need for a dedicated benchmarking framework. Construction companies are generally not very highly capitalized as companies do not hold on to their inventories and products (construction projects). Also, most of the key factors of production in construction are often distributed across several companies rather than one construction company (e.g. equipment is mostly rented, specialist/trade contractors and other project parties who undertake the projects are all separate companies. Again, industry products are each unique robbing construction firms of the benefits associated with repeated production activities, such as reduced cycle time and improved performance. As a result, any benchmarking system for construction companies should reflect the peculiar nature of the industry.

The benchmarking framework developed in this study (fig 4.1) addresses the weaknesses identified in the review and the problems generally associated with benchmarking such as the high costs of implementing benchmarking programmes, problems with identifying suitable partners, and the identification of what to benchmark amongst others. Using the framework developed in this work is not dependent on the availability of a third party partner. It allows for the use of improvised scores to be used as a basis for comparison. Using a scale of 1 to 10, it is assumed that the best-in-class achieve excellent performance (the maximum 10-point award). Construction firms will be able to rate their performance on the 10-point scale relative to the best-in-class.

Opportunities presented by the proposed framework to undertake comparisons without the active co-operation of the benchmark organisation means that benchmarking can be undertaken without the need for expensive site visits and other activities which generally make the costs of such comparisons prohibitive. The identification of CSFs and KPIs will enable the managements of construction firms to make quick decisions regarding what areas they need to improve. The suggested "world-class attributes" will enhance the vision development process and strategic planning by providing a sense of what construction firms should aspire to. These would help identify the relevant areas for cost savings or investment as a means to reducing overall costs and maximising Value Added and Productivity of construction firms.

A major strength of the proposed model is the fact that it incorporates both CSFs and KPIs, thus allowing for both practices and results to be benchmarked. This distinguishes this model from others. The implementation model (fig. 4.2) presents a step-by-step process of how the model can be used as a benchmarking tool.

The high costs associated with benchmarking means only the richest organisations are able to implement benchmarking programmes. The model which has been developed for construction firms is a cost-effective benchmarking model which guarantees a good return on the cost of implementation. CSFs are the organisational or operational activities involved in any programme of improvement which have to succeed if the overall programme will be a success. In choosing which CSFs or KPIs to benchmark, attention should be paid to those which are most frequently used by most successful organisations.

KPIs are indicators which are measured by organisations e.g. defects, profitability etc., and Performance Measures are those measured by external entities, such as customer satisfaction. Unlike some models based on single criterion or a few criteria, comparisons in the proposed framework are based on several factors (CSFs) and indicators (KPIs). Also, the CSFs and KPIs provided allow for the development of hierarchical structures which can be used as measures of organisational and project success for comparisons. To address the difficulties relating to access to comparable data, the proposed model enables for comparisons to be made using an arbitrary scale. This precludes the need for expensive site visits usually related to benchmarking programmes. Unlike complicated models suited to large company structures, the provision of a selection of possible “outcomes” and “world-class attributes” will enable even firms with little or no experience of benchmarking to be able to use the model.

CHAPTER SEVEN

DISCUSSION OF RESULTS

7.1 INTRODUCTION

This chapter discusses the key findings of this research. The main findings of the literature review, the preliminary survey and the field survey are discussed in relation to the objectives of this study. The discussion explores the interpretation and the implications of the results and findings of the study. The discussion provides a basis for assessing if the study‟s objectives have been met and to draw conclusions.

7.2 PERFORMANCE

Performance can be described as the valued productive output *and outcomes from processes or from a* system used for *evaluation and comparison relative to goals, standards, past results, and other organisations*”. It is a measure of how an operation fulfils primary measures as a means to meeting the needs of the customers. Performance describes the behavioural competencies that are relevant to achieving the goals of project-based organisations.

Four (4) types of performance: product and service, customer-focused, financial & marketplace and operational performance can be identified. Service performance describes performance relative to measures and indicators of product and service characteristics important to customers. Financial performance on the other hand describes performance relative to measures of cost, revenue and market position including asset utilization, asset growth and market share. Customer-focused performance refers to performance relative to measures and indicators of customer perceptions, reactions and behaviours in relation to services provided whilst operational performance refers to workforce, leadership, organisational and ethical performance relative to effectiveness, efficiency and accountability measures and indicators.

There is a level of performance where organisations achieve high scores in every area of practice and performance. Organisations which achieve this level of performance are the best in their sectors both in their practices and their results. Such a level of performance is described as world-class and is a mark of international competitiveness. World-class performance is described as performance which matches or exceeds the performance of global best-in-class leaders. Organisations seeking to improve their performance to worldclass levels must compare their performance with industry leaders at a global level as well as undertaking cross-sector comparisons with global leaders.

The term "performance" has been used as an umbrella term for all concepts which consider the success of a company such as quality, dependability, speed and flexibility. It is linked to both productivity and profitability. The productivity of an entity affects its profitability whilst both concepts give an overall measure of performance.

7.3 BENCHMARKING

There is sufficient evidence from literature to suggest that organisations can attain internationally competitive (world-class) performance by emulating the practices of the bestin-class in their sector coupled with progressive performance measurement. It can therefore be deduced that Ghanaian contractors can attain world-class performance through benchmarking against best-in-class organisations and performance measurement.

The effectiveness of benchmarking does not lie in the mere awareness of the standards associated with leading performers but in the commitment to implement the best practices as demonstrated by best –in-class organisations and the lessons learnt from such best-in-class organisations. Emulating and implementing best practices associated with the best-in-class organisations is a means for attaining excellence. Best practices are those factors which account for the success of leading organisations, described in this study as the *critical success factors (CSFs)*. Whilst there is no generic set of critical success factors which will guarantee business excellence, the study found that many global best performers demonstrated different combinations of critical success factors (best practices) to varying degrees consistently.

Benchmarking as a general concept involves the search for best industry practices that are associated with superior performance. It entails a progressive measurement of a company"s products, services and practices against its toughest competitors or those acknowledged as industry leaders". Benchmarking incorporates identifying, learning from and adapting best practices for use within an organisation. It requires constantly emulating the best and aspiring to attain superior performance standards. It has been argued that benchmarking has the potential to improve performance towards world-class performance.

Benchmarking offers an opportunity to bring performance levels within the Ghanaian construction industry in line with performance excellence at the global level. It does not merely expose the weaknesses of the Ghanaian contractors but to expose them to new possibilities of improved performance. Whilst there is no inherent guarantee that benchmarking will lead to improved performance, the commitment to improve processes beyond the best-in-class and to learn from their experience will offer opportunities for improving performance. Benchmarking is a systematic approach to business improvement where best practice is sought and implemented to improve the practices which make up a process beyond the benchmark processes and helps to improve overall performance beyond the benchmark performance. Understanding what constitutes best practice and how this is achieved by the best-in-class serves as a catalyst for organisations aspiring to improve their performance.

Benchmarking implementation can be done at four levels: Internal benchmarking which occurs within an organisation, competitive benchmarking in which benchmarking targets an organisation"s competitors, non-competitive benchmarking against non-competitor organisations and world-class benchmarking which targets the performance of best-in-class in the industry. World-class benchmarking (generic benchmarking) is the highest form and provides a pathway to attain the highest possible results. In this, an organisation compares its processes with the best-in-class whilst exploring opportunities to learn from their processes. Another dimension to world-class benchmarking is to benchmark against the best-in-class performers from other sectors. This provides an opportunity to adapt best practice from other sectors thus deriving from the benefits of the best of the respective sectors.

The first priority in a benchmarking programme is to identify what to benchmark based on the mission and vision of the implementing organisation. This is achieved through a focus on ***practices*** (success factors) or on the ***metrics*** (performance measures) respectively. This study identifies the focus on ***practices*** as a superior approach to benchmarking than a focus on ***results***. Whilst ***metrics*** help to assess the impact of a benchmarking programme, the main thrust of the exercise should be on improving *practices* through comparisons with and emulating the best-in-class. The *critical success factors* and *KPIs* developed in this study will facilitate the benchmarking process for Ghanaian contactors providing a ready set of *practices* and *metrics* from which to choose the priorities for benchmarking efforts.

7.4 DEVELOPMENTS AND PERFORMANCE WITHIN THE UK CONSTRUCTION INDUSTRY

The experiences of many advanced countries show deliberate programmes and strategies to improve the state of the construction industries in these countries. The pursuit of improvement and excellence for example, in the UK construction industry has led to a succession of major industry reports. If the Ghanaian construction industry will achieve the kind of progress that has been made by the construction industries in other countries, innovative programmes are needed which will yield drastic changes and transform the industry from its current state to a level where it can deliver standards of excellence at a global level. Evidence from literature on the UK construction industry reveals a well regulated industry with regular reporting requirements such as annual reports, health and safety regulation etc. Majority of UK construction companies are small-scale with less than one per cent of the total contractor population employing more than 80 employees.

Like many countries, some of the key challenges which the UK construction industry faces include low profitability, low investments in research and development (R&D), a crisis in training, low levels of capital and the predominance of traditional procurement methods which use price as the basis for selecting contractors. The main barriers to performance within the UK construction industry are grouped into following four (4) categories: procurement, briefing and specific problems, problems with design and planning and project management issues. Rethinking Construction identifies benchmarking as presenting opportunities for improving performance in the construction industry. From the literature review, some of the key drivers which can lead to “dramatic improvements” in construction performance are: committed leadership, a focus on the customer, integrated processes and teams, a quality driven agenda, and commitment to people.

In line with the popular position observed in literature about the potential of benchmarking as a tool for improving performance, lessons can be drawn from the structure and organisation of the UK construction industry to improve the structure, organisation and performance within the Ghanaian construction industry. Developments in the UK industry such as the Construction Industry Council (CIC) and the Construction Industry Board (CIB) may be adapted for the Ghanaian construction industry. In the UK example, CIC was the foremost body representing the industry from which CIB evolved. With members drawn from the respective professional groupings within the UK construction industry, CIC served as a common voice of construction professionals in relation to the government. This could provide a blueprint for emulation in the Ghanaian having giving full consideration to sociocultural, political and structural differences between the two countries.

Functions and composition of both CIC and CIB are clearly distinct. Whilst CIC is representative of professionals within the industry, CIB extends beyond the professional groups to include contractor representatives, representatives of sub-contractors, clients and other identifiable bodies within the UK construction industry. The clear distinction between the two bodies justifies the need for these two vital industry groups. The fact that CIB was replaced by the diversified Strategic Forum for Construction justifies the continued relevance of the CIB. It can be concluded that adapting or replicating bodies similar to the UK construction industry‟s CIC and CIB for the Ghanaian industry will contribute to the overall development of the industry in Ghana.

In terms of the further development of the industry, the formation of Constructing Excellence in 2003 as the amalgamation of several previous initiatives and groupings confirms the relevance of a single point of responsibility for promoting excellence in the construction industry. The UK construction industry‟s experience of demonstration projects provided an opportunity to showcase what is good about the UK construction industry. Identifying and celebrating best practice and excellence provides a strong motivation for others to aspire unto excellence. This is a key factor for the success and impact within their respective jurisdictions of the Baldridge Award, EFQM and the Deming Prize. Demonstration Projects in the UK construction industry provides a similar motivation for excellence whilst helping to raise awareness of what constitutes best practice. In the Ghanaian context, notwithstanding predominant perception of underperformance amongst Ghanaian contractors, there are instances of excellence in the management and delivery of construction projects resulting in showpiece projects. Such “demonstration projects” need to be identified and used as examples to educate Ghanaian contractors on standards of excellence and how to achieve the identified standards. Local “demonstration projects” will have a greater potential to motivate local contractors since they will have been undertaken in circumstances common to all Ghanaian contractors unlike projects taken countries from geographically different regions with different social, political and environmental backgrounds.

7.5 THE GHANAIAN CONSTRUCTION INDUSTRY

Available data shows that in relation to the size of the Ghanaian economy, the number of registered contractors is on the higher side. There are virtually no barriers to entry into the

Ghanaian construction industry as contractors. Prospective contractors are thus literally able to attain any class of membership without necessarily possessing the requisite financial, plant, equipment and human resources for the relevant contractor category. None of the ministries, government departments or agencies involved with the registration of contractors has any regulatory systems in place to monitor the performance of contractors or regulate standards.

Sanctions for non-performance on projects do not represent a sufficient deterrent measure to elicit high standards of performance amongst contractors. These and many other factors contribute to a predominating cycle of underperformance which eclipses the few instances of construction excellence in the delivery of major projects. There is however a welcome development of industry led efforts to address standards in the industry through initiatives such as an advocacy campaign for the establishment of an Industry regulator. Whilst these developments relate mainly to contractors, it is envisaged that this is the beginning of a movement towards greater organisation within the industry as a whole. Such a movement will lead to the development of structures and systems which can address the numerous systemic problems which affect the Ghanaian construction industry.

7.6 SOCIO-POLITICAL AND ECONOMIC INFLUENCES ON PERFORMANCE OF GHANAIAN CONTRACTORS

In analysing the performance gap between Ghanaian and UK contractors, due consideration must be given to the wider economic, social and political context of Ghana. For example, generally low income levels present a serious challenge to the mortgage system with a small proportion of the workforce able to save towards paying the mortgage deposit or able to afford monthly mortgage payments. Amongst many real estate developers however, there is a perception that whilst the market potential amongst the middle to low income earners is weak, there is a higher market for the top-end luxury property developments. Again owing to economic considerations, nearly all the real estate developments for sale are centred in Accra. The last major developments of real estate buildings in the second largest city in Ghana, Kumasi, was in the 1982 by the state-owned Social Security and National Insurance Trust (SSNIT) and a private contractor, Kouttam Construction. Developers justify the decision to concentrate real estate developments to the capital, Accra and its environs claiming that developments outside Accra may not yield the appropriate returns on investment.

7.6.1 Factors affecting Ghanaian Contractor performance

From the study, fourteen (14) factors were identified as affecting the performance of Ghanaian contractors as follows:

- Poor access to credit;
- Delays in payment from government and government agencies;
- Cumbersome payment processes;
- Inability to compete in the competitive system of procurement;
- Lack of capacity to compete with foreign owned firms;
- Personnel issues;
- Low workloads;
- Bribery and corruption
- Low technology;
- Inadequate supervision of contracts
- Poor preparation for projects;

- Revision of bills of quantities;
- Politicisation of the contract bidding process; and
- Lack of effective barriers to entry.

7.6.2 Most critical of the factors affecting contractor performance

Using factor anlysis, the most critical of the 14 problems affecting Ghanaian contractors were extracted.

The five (5) factors extracted are:

1. Poor access to credit;
2. Lack of capacity to compete with foreign owned firms;
3. Low technology available to construction firms;
4. Poor preparation for projects e.g. project planning; and
5. Contracts awarded on the basis of one‟s political affiliation.

Amongst the 5 factors which had the greatest impact on Ghanaian contractor performance, "access to credit" was the factor cited by most respondents as affecting their performance. This position is supported by the factor loadings which show "access to credit" with the highest factor loading as having the biggest variance compared to the other factors. The reasons why banks shun contractor finance were further explored through a survey of major banks in Ghana and reported separately in this report.

7.6.3 Contractor views on why banks do not support construction

In this section, Ghanaian contractor views on banks‟ reluctance to finance construction projects are explored. Contractors were asked how each of the 7 selected problems below generally percieved to affect contractor performance impacted on their chances of raising finance. The problems are:

1. Construction firms lack collateral;
2. Many construction firms do not pay back contracted loans;
3. Interest rates are too high and thus bank loans are not attractive to construction firms;
4. Bank loans are not suitable for construction;
5. Low profit margins in the construction industry;
6. Government does not pay contractors on time to enable them to repay back loans; and
7. Contractors lack the personnel to successfully manage projects funded with loans.

Using factor analysis, the following problems were extracted as the commonest reasons given by banks for not financing construction projects and contractors generally:

1. Low profit margins in the construction industry
2. The government does not pay contractors on time to enable them to repay back loans
3. Construction firms lack the requisite personnel to successfully manage projects.

7.6.4 Reasons given by banks for low levels of support offered to contractors

Banks were asked to give reasons for the low levels of financing provided for contractors choosing from the pool of 12 reasons below:

1. Construction firms lack collateral;
2. Construction firms do not repay loans;
3. Construction firms are too reliant on government for cashflow;
4. Construction firms lack experienced personnel to manage loan funded projects;

5. Construction firms lack the relevant equipment to undertake projects;
6. Construction firms do not have adequate turnover;
7. Construction firms do not make enough profits;
8. Construction firms do not win enough projects to break-even;
9. Construction firms never present business plans;
10. Construction firms do not present robust business plans;
11. The construction industry is too heavily politicized; and
12. A perception of widespread corruption in the industry erodes confidence in the construction industry.

The responses were analysed using factor analysis which extracted five (5) stated below as the major reasons which were mostly given by banks as a basis for not supporting contractors:

1. Construction firms do not repay loans;
2. Construction firms lack the relevant equipment to undertake projects;
3. Construction firms do not make enough profits;
4. Construction firms never present business plans; and
5. A perception of widespread corruption in the industry erodes confidence in the construction industry.

In the search for solutions to the low levels of support available to contractors from banks, the most prominent of the reasons given above by the banks need some further consideration and analysis to identify any underlying causes.

7.6.5 Most prominent reasons why banks do not finance contractors

The reasons offered by banks as the most important reason s were explored using factor analysis. Those considered most important by the banks were:

1. Contractors lack the personnel to manage projects;
2. Profit margins for projects are low; and
3. Government does not pay contractors on time.

This however does not imply that the other factors are less relevant where they occur but that they are more frequently cited by banks as the reason for not supporting contractors.

7.7 CRITICAL SUCCESS FACTORS (CSFS)

From the original list of 16 CSFs, the 8 were extracted from the factor analysis as follows:

1. Quality and zero defects culture;
2. Organisational design;
3. Work culture and work environment;
4. Client satisfaction;
5. Strategy;
6. Leadership;
7. Measurement, analysis of information and knowledge management; and
8. Implementation of Lean Principles.

These variables represent the CSFs considered to be most relevant to Ghanaian contractors by the contractors surveyed in this study. In order to achieve performance excellence, Ghanaian contractors should therefore aim to improve their performance in these CSFs. Whilst taking the relevant actions to improve in these CSFs, they should continually measure their performance in these CSFs and benchmark against best-in-class organisations using the CSFs.

Whilst there are other factors which also can help organisations achieve varying degrees of success, the CSFs proposed in this study represent a checklist for Ghanaian contractors new to benchmarking. The CSFs in themselves will not automatically lead to improved performance but are a means to an end. They highlight the areas that organisations seeking to improve their performance must focus their efforts and seek to improve. The effective integration of these into the management and business practices of organisations will lead to internationally competitive performance.

The CSFs identified in this study can be used by Ghanaian contractors as the key targets for improving performance. In the case of Ghanaian contractors, the CSFs can be used as the criteria for:

i. Benchmarking their performance against the best-in class;

ii. Performance measurement; and iii. Setting targets for

improving their performance.

For the purposes of benchmarking, Ghanaian contractors may choose from the list of CSFs in line with the vision set out by top management. Contractors new to benchmarking or those with little experience of benchmarking may start with just a few CSFs at a time. It is recommended that not more than four (4) CSFs be selected for benchmarking at a time.

The set of eight (8) CSFs developed in this study are incorporated into the Benchmarking Framework and Implementation Model developed in this study. This simplifies the process of identifying what to benchmark by providing a set of ready options from which organisations may choose.

7.7.1 Key performance indicators (KPI)

In keeping with the trend observed in the major KPIs reviewed in this study, the KPIs developed in this study for Ghanaian contractors is a KPI Framework covering the most commonly used measures. The Ghanaian contractors‟ KPI Framework covers all the major KPI categories which from the literature reviewed are relevant both for building and road contractors. Using groups instead of the individual measures presents a simplified approach to using the KPIs for measuring performance and for benchmarking, especially for organisations with little or no experience of benchmarking. There is evidence from literature which suggests that the use of performance indicators by the construction industry can lead to dramatic improvements in performance.

The ten most common KPIs deemed to be most relevant for construction were selected for Ghanaian contractors. These are:

1. Client satisfaction;
2. Cost;
3. Time;
4. Quality;
5. Health and safety;
6. Business performance;
7. Productivity;
8. Predictability;
9. People; and

10. Environment.

These KPI groups can be used by Ghanaian contractors as the basis for:

i. Benchmarking performance against the best-in-class organisations; ii. Measuring performance; and iii. Setting targets for improving their performance to internationally competitive levels.

As a benchmarking tool, the KPI groups are incorporated into the Conceptual Benchmarking Framework developed for Ghanaian contractors shown in Fig 6.1(Ofori-Kuragu and Baiden, 2008) in line with the objectives of this study.

As a performance measurement tool, the KPIs developed can be used by third party groups such as potential clients as the criteria for assessing the performance of Ghanaian contractors. They provide a basis for comparing the performance of Ghanaian contractors with best-inclass contractors. As part of general improvement efforts, the KPIs present a set of criteria which Ghanaian contractors can select from for targeted improvement. The KPIs developed in this study were originally identified from the literature study and have been adapted to the Ghanaian construction industry. Since the overall aim of the study is to enable world-class performance in Ghanaian contractors, the KPIs developed must be consistent with those used by the best-in-class organisations and in countries which have some of the best contractors. Whilst the seven (7) measures extracted using factor analysis are generally consistent with existing KPIs used in industry which were collected from literature, the exclusion of "Time" and "Productivity" from the list for Ghanaian contractors is not consistent with the general trends observed from literature. Many of the examples reviewed and used by the construction industries in the UK, USA and Denmark include “time” and “productivity”. In order to bring the list of KPIs being developed with the leading countries mentioned in this section – UK, USA and Denmark, it was decided to add on “Time” and “Productivity” to the list developed for Ghanaian contractors.

In the case of “environment”, whilst it is very popular with the older literature, especially for non-construction KPIs, trends in the UK construction industry KPIs underline its growing importance. There is an increasing awareness and demand amongst clients at the global level for sustainable construction products and carbon -neutral construction. Whilst the level of awareness is low as shown by the preferences of the Ghanaian contractors shown by the survey, its relevance at the global level is not in doubt. There is a need for improved awareness amongst Ghanaian contractors on environmental issues. “Environment” is thus maintained amongst the Ghanaian contractor KPIs. The challenge is to improving the awareness amongst Ghanaian contractors of environmental issues and the need for sustainable construction.

The final list of 10 KPIs for Ghanaian contractors are:

1. People;
2. Client Satisfaction;
3. Cost;
4. Predictability;
5. Quality;
6. Health & Safety;
7. Business Performance;
8. Time;
9. Productivity; and

10. Environment.

Whilst none of the original 10 KPIs has been excluded, the factor analysis has demonstrated the preferences of Ghanaian contractors as well as areas where additional attention is required to achieve balanced improvements across all sectors of performance within the Ghanaian construction industry.

7.8 BENCHMARKING FRAMEWORK & IMPLEMENTATION MODEL

Best-in-class firms from the leading industries have world-class operations and use best practices to produce world-class excellence in their performance. Cross-industry comparisons with best-in-class organisations help identify best practices and provide an understanding of the levels of performance associated with world-class performance. Such comparisons help to identify the practices used by the best-in-class organisations and how such world-class organisations attain excellence. Benchmarking models provide a framework which enables such comparisons to be undertaken. However construction industry-specific methods for doing this are lacking.

To be successful, the benchmarking framework proposed in this study should address the perceived weaknesses identified in the review. It should address the problems generally associated with benchmarking such as the high costs of implementing benchmarking programmes, problems with identifying suitable partners and the identification of what to benchmark amongst others. Benchmarking helps to identify the gaps in performance and the actions required to improve performance. The high costs associated with benchmarking means only the richest organisations are able to implement benchmarking programmes. It was an important consideration that the model developed for construction firms in this study is a cost-effective benchmarking model which guarantees a good return on the cost of implementation.

The model integrates both the "process" or practices and results criteria representing the CSFs and KPIs respectively. In general terms, CSFs are the organisational or operational activities involved in any programme of improvement which have to succeed if the overall programme will be a success. In the context of benchmarking, CSFs are the operational and organisational practices which must go well in order for a benchmarking programme to be successful. In choosing which CSFs, KPIs to benchmark, attention should be paid to those which are most frequently used by most successful organisations. In the case of the CSFs, it is suggested that the number selected be between four and eight. A framework consists of the logical steps involved in a process. The benchmarking framework developed in this research is a step-by-step presentation of the activities undertaken as part of the benchmarking process. It shows the most important factors responsible for business success (CSFs), and how these are related to the attainment of the characteristics associated with world-class organisations.

7.8.1 Benchmarking Framework for Ghanaian Contractors

The best-in-class companies have world-class operations and use best practices to produce world-class excellence in their performance. Cross-industry comparisons with best-in-class organisations help identify best practices and an understanding of the levels of performance associated with world-class performance. Cross industry comparisons between construction firms and leading global entities will identify the practices used by the best-in-class organisations and how such world-class organisations attain excellence. Benchmarking models provide a framework which enables such comparisons to be undertaken however construction industry-specific methods for doing this are lacking.

The characteristics of the construction industry make it unique justifying the need for a dedicated benchmarking framework. Construction companies are generally not very highly capitalized as companies do not hold on to their inventories and products (construction projects). Also, most of the key factors of production in construction are often distributed across several companies rather than one construction company (e.g. equipment is mostly rented, specialist/trade contractors and other project parties who undertake the projects are all separate companies. Again, industry products are each unique robbing construction firms of the benefits associated with repeated production activities, such as reduced cycle time and improved performance. As a result, any benchmarking system for construction companies should reflect the peculiar nature of the industry.

The benchmarking framework developed in this study (fig 4.1) addresses the weaknesses identified in the review and the problems generally associated with benchmarking such as the high costs of implementing benchmarking programmes, problems with identifying suitable partners, and the identification of what to benchmark amongst others. Using the framework developed in this work is not dependent on the availability of a third party partner. It allows for the use of improvised scores to be used as a basis for comparison. Using a scale of 1 to 10, it is assumed that the best-in-class achieve excellent performance (the maximum 10-point award). Construction firms will be able to rate their performance on the 10-point scale relative to the best-in-class.

Opportunities presented by the proposed framework to undertake comparisons without the active co-operation of the benchmark organisation means that benchmarking can be undertaken without the need for expensive site visits and other activities which generally make the costs of such comparisons prohibitive. The identification of CSFs and KPIs will enable the managements of construction firms to make quick decisions regarding what areas they need to improve. The suggested "world-class attributes" will enhance the vision development process and strategic planning by providing a sense of what construction firms should aspire to. These would help identify the relevant areas for cost savings or investment as a means to reducing overall costs and maximising Value Added and Productivity of construction firms. A major strength of the proposed model is the fact that it incorporates both CSFs and KPIs, thus allowing for both practices and results to be benchmarked. This distinguishes this model from others. The implementation model (fig. 4.2) presents a step-bystep process of how the model can be used as a benchmarking tool. The high costs associated with benchmarking means only the richest organisations are able to implement benchmarking programmes. The model which has been developed for construction firms is a cost-effective benchmarking model which guarantees a good return on the cost of implementation. CSFs are the organisational or operational activities involved in any programme of improvement which have to succeed if the overall programme will be a success. In choosing which CSFs, KPIs to benchmark, attention should be paid to those which are most frequently used by most successful organisations.

Summary

In this chapter, the key findings of this study were discussed starting with the main findings of the literature review and preliminary survey. The results from the field survey were discussed in relation to the objectives of this study. The discussion explored the interpretation and the implications of the results and findings of the study and provided a basis for assessing if the study‟s objectives were met and to draw conclusions.

CHAPTER EIGHT

VALIDATION OF RESEARCH OUTPUTS

8.1 INTRODUCTION

In this chapter, the key findings and outputs of this research are subject to review by peers, experts and key industry stakeholders to test for their robustness. Key findings arising from the literature study were subject to peer review at major conferences in the course of the study.

The key deliverables of the study – the Benchmarking Framework for Ghanaian contractors, the Benchmarking Implementation Model, the Contractor Scorecard and Project Scorecard – were in addition tested by Ghanaian contractors, representatives of professional groups within the Ghanaian construction industry, academics, policy makers, public officials working in the Ghanaian construction industry and experts on the Ghanaian construction industry. This section reports the feedback received from the validation process and improvements made to the outputs of this research as a result of the feedback.

8.2 APPROACHES TO VALIDATION

Ahadzie (2008) identified five main techniques for undertaking external validation as follows:

1. Using independent verification obtained by waiting until the future arrives or through the use of surrogate variables;
2. Splitting the samples and using one part for estimating the model and the other for validation;
3. Re-sampling, taking repeated samples from the original sample and refilling the model each time;
4. Using Stein‟s equation of re-calculating the adjusted coefficient of determination (R_2) (Field, 2005; cited in Ahadzie, 2008); and
5. Approaching experts to comment on relevant aspects of the model including potential benefits.

Because the benchmarking framework, implementation model and the performance measurement tool developed in this study have been customised for Ghanaian contractors, it was decided to use experts from the Ghanaian construction industry to trial and provide feedback and comments on relevant aspects of the deliverables arising from this study. This approach to validation is similar to Agbodjah (2008) in which review meetings are held with a panel of experts to validate a People Management Policy Development (PMPD) Framework developed for large construction companies in Ghana. Agbodjah (2008) uses a panel of 12 experts comprising eight (8) drawn from industry professional and trade associations and four (4) academics. Following a presentation on the PMPD Framework, the panel answered questions on an assessment form developed using a Likert Scale which were later collected and assessed.

Moriarty (2008) adopts the epistemological validation approach in which research outputs are validated against the provisions of existing benchmarking frameworks to assess the extent to which the research outputs conform to literature on existing frameworks. The main frameworks used in the epistemological validation are the Spendolini (1992) framework and the Anand and Kodali (2008) frameworks both of which have been reviewed in this study. One major shortcoming of this approach is how to determine which of the many existing frameworks to validate against.

Benchmarking has evolved from the approach which focused mainly on performance measures to one which focuses on the management activities and the practices which lead to superior performance (Voss et al, 1994).

Voss et al (1994) identify two ways in which benchmarking can be carried out:

i. Collaborative benchmarking and benchmarking clubs; and ii. Benchmarking through visiting leading companies.

The first approach allows for organisations with common aspirations to explore and chart a common cause for improving their performance. In the latter approach, the focus is on the leader with a focus on learning from how the leader achieves excellence.

8.2.1 Testing a Benchmarking Framework

In the development of research-based tools, testing content validity can be used to ensure that any measures of performance have the appropriate meaning in relation to the concept being measured. This can be achieved by ensuring that all tools developed are based on extensive review of literature (Voss et al, 1994).

The final stage in the development of research-based benchmarking tools is to test for usability and usefulness. The test for usability involves an exploration of whether the tool developed can be used in practice. Testing for usefulness involves a procedure to establish whether practitioners find the tool developed to be of real benefit to them (Voss et al, 1994).

The benchmarking tool developed in Voss et al (1994) is tested for usability in three phases. Phase 1 tests the understanding of the framework and its terminology. In phase 2, the six companies taking part in the trial were asked to use the developed tools unaided. In the last phase, a dry run of a full benchmarking process was conducted for all the participating firms (Voss et al, 1994). In the test for usefulness, Voss et al (1994) uses qualitative a qualitative approach in which the participants were asked a set of explicit questions on their experiences using the tool.

8.3 METHODS USED FOR VALIDATION IN THIS STUDY

Drawing inferences from the examples reviewed in this study, a range of approaches have been used to validate the key research outputs from this study. The mix of methods used includes peer review, expert interviews and to a lesser extent epistemological approaches. The Benchmarking Framework for Ghanaian contractors and Benchmarking was presented at the Royal Institute of Chartered Surveyors (RICS) Construction, Building and Real Estate Research Conference (COBRA) 2008 held in Dublin. A paper on the framework was published in the peer reviewed recording of conference proceedings arising from the conference. In addition to feedback from the peer review process, the conference offered an opportunity to receive feedback which was used to improve further developments of the benchmarking framework. The revised Benchmarking Framework and Benchmarking Implementation Model were validated using questionnaire based expert interviews of selected experts from the Ghanaian construction industry.

A paper on the KPIs - **Key performance indicators (KPIs) for enabling world-class performance by Ghanain contractors** was presented at the *Conference for Postgraduate Researchers of the Built & Natural Environment (PRoBE)* organised in Glasgow by the Glasgow Caleidonian University in 2009. The peer review process provided a useful opportunity to obtain feedback and comments which helped to address any problems identified.

8.3.1 Validation Interviews

Expert interviews were conducted with selected experts drawn from a broad spectrum of the Ghanaian construction industry to validate the key findings and assess the effectiveness of the main research deliverables. The interviews were conducted using semi-structured questionnaires. The development of the semi-structured questionnaires was based on the main findings of the study and the tools developed from the research. In all, 10 Ghanaian experts were targeted including contractors, consultants, academics and researchers drawn from the construction industry. Respondent contractors were selected to include a large, medium and a small contractor respectively to ensure that feedback was provided from their respective perspectives. A major criterion for selecting respondents was to choose professionals with substantial professional experience of working in the Ghanaian construction industry.

8.4 DESIGN OF RESEARCH INSTRUMENT FOR VALIDATION

The validation questionnaire was designed to mainly assess the effectiveness and usability of the main products of this research – the Benchmarking Framework for Ghanaian contractors and the accompanying Benchmarking Implementation Model and the performance measurement tools – ***ProScor*** and ***ConScor.***

Using a Likert Scale, the experts were asked for their views on the simplicity of the respective tools, terminology used, how easy the tools were to use, the potential contribution the respective tools could make to the benchmarking process in an organisation and to what extent they thought the tools could improve performance in an organisation. Respondents were also asked to identify any observed weaknesses of the respective tools, make general or specific recommendations for improving the tools and their readiness to try-out the tools in their respective organisations.

8.4.1 Pre-testing of measuring instrument

The validation questionnaire was pre-tested on three experienced construction industry professionals – an academic, consultant and a contractor to identify potential flaws in the design and any general improvements required. The feedback received from the pre-testing was used to improve the structure and layout of the questionnaires before the actual validation exercise. Difficult and less familiar terminology were either removed or explained and additional notes provided where required improving understanding.

8.5 PROFILE OF THE RESPONDENTS

Respondents were carefully selected to ensure that they were experienced professionals in their respective fields. The ten (10) respondents each had a minimum of fifteen (15) years‟

experience working in the Ghanaian construction industry. Consideration was given to selecting senior officials able to make a contribution to the policy-making process in their respective establishments whilst ensuring balance in the spread of professional backgrounds. This was to ensure that they had access to the relevant information required to address the issues raised in the questionnaire whilst bringing on board a broad range of experiences. In addition to contractors whom the major products of this study targeted, one highly experienced professional – an expert from each field – was selected to provide feedback as part of the process. The respondents comprised of a senior Architect, senior Quantity Surveyor, and a leading Academic - a Professor of international repute with a good understanding of the workings of the Ghanaian Construction Industry. Also, there was a senior official of the Public Procurement Authority with responsibility for benchmarking and a background in construction and the director of a leading construction research institute in Ghana.

8.6 FEEDBACK FROM THE VALIDATION PROCESS

The responses received from the select panel of experts from the Ghanaian construction industry provided useful feedback which was used to improve the tools developed in this study. The comments provided by the respondents covered all the four (4) tools presented in the questionnaire for review. The usability and usefulness of the respective tools were explored using a Likert scale. On a scale of 1 to 5, where 1 represented "strongly disagreed" and 5 represented "strongly agreed", respondents were asked about how simple the respective tools were, how easy the terminology used were to understand and how easy the tools were to use. Also respondents" were asked about their perceptions of how the tools would improve the benchmarking process, the confidence that the tool will lead to performance improvements and the respondents" willingness to implement the respective tools in their own organisations if they had the opportunity. Again, respondents were given the opportunity to identify any weaknesses in the tools and to offer general suggestions for improving the structure, presentation, usability and potential benefits associated with the tools. The feedback received from the validation exercise is compiled in the next stage of the report. This is grouped in accordance with the respective tools starting with more general recommendations relating to the specified tools.

8.6.1 The Benchmarking Framework for Ghanaian Contractors

One of the main problems identified in the responses was with the terminology. Four (4) of the respondents were of the opinion that some of the terms used in the framework may not be easily understood by Ghanaian contractors. Examples of these terms which proved problematic were KPIs, WIP, Lead Times and Lean Construction. This problem has been addressed by including a glossary of key terms and abbreviations as an attachment to the respective tools. It is seen as helpful to incorporate formal orientation sessions for potential users to clarify any difficult words associated with particular tools.

Table 8.1 Validation feedback scores for Benchmarking Framework for Ghanaian Contractors

Factor	Average Score
The Benchmarking Framework for Ghanaian contractors is simple to use	3.1
The terminology used in the Benchmarking Framework for Ghanaian contractors is easy to understand	3.5
The Benchmarking Framework for Ghanaian contractors is easy to use	3.4

The Benchmarking Framework for Ghanaian contractors makes the benchmarking process simple	3.0
I am confident that this tool can help us improve our performance	3.7
I will be ready to try out the Benchmarking Framework for Ghanaian contractors	3.8

Other specific comments related to the presentation of the framework and included suggestions that options provided for KPIs and CSFs are presented as bullet points and suggestions to increase some font sizes. One respondent suggested that the positions of the CSFs and KPIs respectively on the Benchmarking Framework be reversed to illustrate a better order of precedence in the benchmarking process, the argument being that "KPIs should flow from the CSFs because it is only when I know what constitutes „success" that I can develop „indicators" to point to their achievement or otherwise". The averages of the respective responses to questions on the usability of the framework are shown in table 8.1.

8.6.2 Identified weaknesses and suggestions

Some of the weaknesses of the benchmarking framework identified by respondents included one which commented that the terminology used in the framework appeared to be based on a premise that contractors who use it would understand all the terms used. There was also an observation that the starting point of the framework was not obvious. Another key observation was that "owing to the outward direction of the arrows pointing to them, the box at the top of the diagram does not seem to be integrated into the rest of the model at all, and the ellipse with

„Vision‟ only partially so". These comments have been addressed with changes and modifications to the structure of the Benchmarking Framework for Ghanaian contractors.

Amongst the key suggestions were that the use of unfamiliar and difficult terminologies be minimised and that where possible, abbreviations be written out in full. There was also a suggestion that an educational programme for contractors be developed to explain how the Framework works and the potential benefits to contractors for using the framework.

8.6.3 Feedback for Benchmarking Implementation Model

Most of the respondents indicated that their responses to questions on the Benchmarking Implementation Model were similar to those for the Benchmarking Framework. Some of the more specific observations included one that the boxes in the flowchart from „Vision‟ to „Goals‟ were of the same shape and size although some contained actions, and some products". Changes have been made in the shapes and sizes to reflect the actions and products involved wherever required. One respondent also observed "that „Select Performance Measures‟ came too late and that It should actually be done when the KPIs were selected". This observation could be extended to the Benchmarking Framework too. There was also a comment that "it is not clear why the contents of the „Optional‟ relate to the rest of the model. In any case, why is it needed here?" Table 8.2 below shows the average scores for questions on the usefulness and usability of the Benchmarking Implementation Model.

Table 8.2 Validation feedback scores for Benchmarking Implementation Framework

Factor	Average Score

The **Benchmarking Implementation Model** is simple to use	3
The terminology used in the **Benchmarking Implementation Model** is easy to understand	3.6
This tool is easy to use	3.1
The **Benchmarking Implementation Model** makes the benchmarking process simple	3.1
I am confident that this tool can help us improve performance	3.1
I will be ready to try out the **Benchmarking Implementation Model**	3.2

8.6.4 Feedback for Contractor Scorecard (ConScor) and Project Scorecard (ProScor)

In comparison with the Benchmarking Framework and Benchmarking Implementation Model, the performance measurement tools received fewer comments. The commonest issue amongst respondents was the fact that the two Scorecards appeared to have been designed for projects more than one million Ghana Cedis, a position held by five (5) respondents. This has been amended to reflect small and large projects. Some of the more specific observations included one which asked if there were "methods for „measuring" the qualitative indicators such as Client Satisfaction, Quality and Health and Safety". In response to these, more specific measures were introduced to enable these indicators to be more easily measured in the respective scorecards. General comments about the structure of the scorecards included suggestions to provide space or bigger spaces for specified items. These have been responded to with modifications where necessary. Table 8.3 and table 8.4 represent average scores for the respective validation criteria for ***ConScor*** and ***ProScor*** respectively.

Table 8.3 Validation feedback scores for Contractor Scorecard *(ConScor)*

Factor	Average Score

The Contractor Scorecard (*ConScor*) for Ghanaian contractors is simple to use	4
The terminology used in the Contractor Scorecard (*ConScor*) is easy to understand	3.7
The Contractor Scorecard (*ConScor*) is easy to use	3.6
The Contractor Scorecard (*ConScor*) makes the benchmarking process simple	2.6
I am confident that The Contractor Scorecard (*ConScor*) can help us improve our performance	3.3
I will be ready to try out the Contractor Scorecard (*ConScor*)	3.1

Table 8.4 Feedback scores for Project Scorecard *(ProScor)*

Factor	Average Score
The Project Scoresheet (ProScor) for Ghanaian contractors is simple to use	3.2
The terminology used in the Project Scoresheet (ProScor) for Ghanaian contractors is easy to understand	3.6
The Project Scoresheet (ProScor) for Ghanaian contractors is easy to use	4.1
The Project Scoresheet (ProScor) for Ghanaian contractors makes the benchmarking process simple	4.0
I am confident that Project Scoresheet (ProScor) for Ghanaian contractors can help us improve performance	3.7
I will be ready to try out the Project Scoresheet (ProScor) for Ghanaian contractors	3.7

8.6.5 Validation Summary

The overall average of the respective mean scores is 3.472. On the Likert Scale of 1 to 5 used in the validation questionnaire, this suggests that responses are generally positive for the respective tools in terms of their usability and usefulness. The comments and observations made by the respondents have been generally incorporated into the developed tools as required. Suggestions have been considered and identified weaknesses have been addressed. The final products incorporated in the theses reflect all the modifications and improvements made and will hopefully enrich the user experience and enhance the potential benefits of using these tools developed in this study.

CHAPTER NINE

CONCLUSIONS AND RECOMMENDATIONS

9.1 INTRODUCTION

In this section, the main conclusions of this research are presented with recommendations for key actors within the Ghanaian construction industry. The conclusions summarise what has been done in this study, how it was done and what has been achieved. The recommendations the proposals made to address the issues raised in this study. The recommendations cover both general recommendations and specific recommendations based on the key outcomes issues arising from the literature review and a synthesis of the main findings, results and analysis of field interviews.

9.2 CONCLUSIONS

The conclusions are presented in line with the objectives of the study. General recommendations are made for addressing key problems identified in the study. Also presented in this section are recommendations and pathways for further research.

9.2.1 Conclusions for objective 1

To evaluate the need for improvements in the delivery of projects by Ghanaian contractors and establish the factors affecting Ghanaian contractor performance.

This study started with an exploration of the performance of Ghanaian contractors. The performance of the Ghanaian contractors was benchmarked against the best contractors in the UK. Comparisons were based on turnover, pre-tax profits and employee numbers. Also, the productivities, predictability, time performance and cost performance of the participating Ghanaian contractors were compared with the industry averages in the UK. Performance data on Ghanaian contractors was obtained through a preliminary survey of Ghanaian contractors. Data on the selected UK contractors and the UK construction industry were obtained from UK contractor league tables and industry data from Construction Excellence, UK.

The study showed significant differences in the levels of performance between the Ghanaian and UK contractors. The impacts of the social, economic, cultural and political contexts on performance within the UK and Ghana contexts respectively have been acknowledged. Generally the stronger UK economy and high income levels mean more people are able to acquire mortgages to buy property thus increasing the demand for more housing developments. In Ghana, social practices and beliefs may mean that repossessed houses are difficult to sell on. So whilst mortgage defaults result in repossessions of property which may be auctioned to recover outstanding credit owed to banks, general attitudes to such property means market for auctioned property is limited in Ghana. Despite the impact of social, cultural, economic and political factors on Ghanaian contractor performance, comparisons with leading performers in the construction industry and beyond should help establish challenging standards for emulation as a means to attaining world class performance.

9.2.1.1 Factors affecting performance of Ghanaian contractors

From the literature review, 14 factors were identified as affecting the performance of Ghanaian contractors. These are:

1. Poor access to credit;
2. Delays in payment from government and government agencies;
3. Cumbersome payment processes;
4. Inability to compete in competitive bidding processes;
5. Lack of capacity to compete with foreign owned firms;
6. Personnel issues e.g. motivation and experience of staff;
7. Low workloads;
8. Bribery and corruption in the construction industry;
9. Low technology available to construction firms;
10. Inadequate supervision of projects;
11. Poor preparation for projects e.g. project planning;
12. Revision of bills of quantities during project implementation;
13. Contracts awarded on the basis of one"s political affiliation; and
14. The relative ease associated with registering to become contractors.

Analyses of the problems using factor analysis showed that the most common problems, cited by most contractors interviewed as having the most significant effects on performance were:

1. Poor preparation for projects;
2. Cumbersome payment processes;
3. Bribery and corruption in the construction industry; and
4. Low workloads of Ghanaian contractors.

Access to financing was found to be a common problem by most of the respondent contractors. This problem was thus explored further with banks to identify the barriers to contractor access to finance. The main reasons given by banks for not financing contractors are that:

1. Construction firms do not repay loans;
2. Construction firms lack the relevant equipment to undertake projects;
3. Construction firms do not make enough profits;
4. Construction firms never present business plans; and
5. A perception of widespread corruption in the construction industry.

9.2.2 Conclusions for objective 2

To identify the critical success factors for enabling world-class performance in Ghanaian contractors.

This study explored the development of a set of critical success factors (CSFs) which can help underperforming contractors in Ghana to improve their performance to world-class levels. CSFs are best practices which organisations can adapt to their operations to improve their performance. They provide a framework for underperforming contractors to measure their performance and benchmark against best-in-class organisations and implement improvement programmes. CSFs show the critical areas where management efforts should be focused as a means to improving overall performance. Ghanaian contractors can use the CSFs identified in this study to improve their performance by comparing their performance with the performance of industry leaders in selected CSFs. Attaining world-class construction performance is a progressive effort which can start with the implementation of one or multiple CSFs at a time. Contractors with little or no experience of benchmarking may start with one at a time whilst more experienced organisations may be able to implement several CSFs at a time. The eight CSFs (8) developed in this study are as follows:

1. Organisational design
2. Implementation of Lean Principles
3. Work culture and work environment
4. Measurement, analysis of information and knowledge management
5. Client satisfaction
6. Leadership
7. Strategy
8. Quality and zero defects culture

These CSFs are considered to be most relevant to Ghanaian contractors by the contractors surveyed in this study. In order to achieve performance excellence, Ghanaian contractors should aim to improve their performance in these CSFs, continually measure their performance and benchmark against best-in-class organisations using the CSFs.

Whilst there are other factors which also can help organisations achieve varying degrees of success, the CSFs proposed in this study represent a checklist for organisations new to benchmarking. For such organisations, this is a useful first step to the ultimate attainment of business excellence.

The CSFs in themselves will not automatically lead to improved performance but are a means to an end. They highlight the areas that organisations seeking to improve their performance must focus their efforts and seek to improve. The effective integration of these into the management and business practices of organisations has the potential to deliver internationally competitive performance.

9.2.3 Conclusions for objective 3

Establish a set of key performance indicators for enabling world-class performance amongst Ghanaian contractors.

Ten (10) KPI groups have been proposed for use by Ghanaian contractors to help with performance improvement. The proposed KPI groups are: client satisfaction, cost, time, quality, health and safety, business performance, productivity, predictability, people and environment. These KPI groups can be used by Ghanaian contractors as the basis for measuring performance, comparing their performance to best-in-class organisations and setting targets for improving their performance to internationally competitive levels. In addition, the KPIs can be used by clients and other third party groups as the criteria for benchmarking and assessing the performance of Ghanaian contractors. The KPI groups have been incorporated into the Benchmarking Framework developed for Ghanaian contractors, shown in fig 4.1 (Ofori-Kuragu and Baiden, 2008). They are also used in the performance measurement tools – ***ProScor*** and ***ConScor*** which have been developed in this study for Ghanaian contractors.

9.2.4 Conclusions for objective 4

To develop a cost-effective benchmarking framework that can be used by underperforming Ghanaian construction companies to measure and benchmark their performance.

The benchmarking framework developed in this study (fig 4.1) shows the factors important to organisational performance and how these are related to each other. It provides a pool of CSFs and KPIs from which construction firms may select based on their Vision, objectives and priorities. The provision of a set of CSFs and KPIs will enable quicker decisions by managements when considering organisational or project areas to improve and enhance value judgements by decision makers. Improved and faster decision making will improve project completion times leading to overall cost savings, increased Value Added and Productivity.

The innovation in the proposed framework is in the fact that benchmarking using the model can be undertaken independent of the co-operation of a third party benchmarking partner. This will lead to lower costs of benchmarking and remove the problem of identification of suitable partners for benchmarking programmes.

Finally, the proposed framework provides the characteristics of world-class performance which will enable construction firms to assess their performance after benchmarking implementation to determine if international competitiveness has been attained.

9.2.5 Conclusions for objective 5

To develop a system that enables client groups to independently assess the capacity and performance of construction contractors.

In this study, a Performance Measurement System (PMS) has been developed for Ghanaian contractors. The PMS for Ghanaian contractors consists of two separate tools – the Project Scoresheet (***ProScor***) and the Contractor Scorecard (***ConScor***). ***ProScor*** is used to measure contractor performance on specific projects whilst ***ConScor*** tracks the overall performance of contractors over a number of projects. Generally, projects included in ***ProScor*** and ***ConScor*** should not be more than three years old. This allows for only projects which are fairly representative of the company‟s current or recent performance to be included in the measurement. Both ***ProScor*** and ***ConScor*** are based on the set of 10 KPIs developed in this study for Ghanaian contractors.

ProScor allows for mitigating circumstances that may have negatively impacted on performance to be recorded. Contractors are specifically asked if particular projects should be included in their project record. Where extenuating circumstances are determined, discussions should be held with the contractor to determine whether or not to include the projects involved in the scoresheet.

9.3 RECOMMENDATIONS ARISING FROM THIS STUDY

1. The Ghanaian construction industry needs to develop strong professional institutions. In addition to the Ghana Institution of Surveyors (GhIS) and the Ghana Institute of Architects (GIA) and the Ghana Institution of Engineers (GhIE), more strong professional bodies are needed for the other professional groups within the industry such as Project Managers, Structural Engineers and Services Engineers. It is recommended that industry-wide representative bodies be established to provide both regulatory and advocacy support to the industry. It is proposed that all major stakeholders in the Ghanaian construction industry come together to form the Construction Industry Council, Ghana (CICG) to advance the collective interests of stakeholders within the Ghanaian construction industry. The proposed Construction Industry Council, Ghana (CICG) will bring together all major stakeholders within the industry. The Council will be a high level committee made up of the Presidents and past Presidents of the respective professional bodies within the Ghanaian construction industry such as GhIS, GIA and GIOC and GhIE and Professors in Construction from academic institutions both in service and retired. The Council will be responsible for initiating action to address amongst other things pressing issues affecting the industry and problems identified in this study as facing Ghanaian contractors such as:

i. Poor access to credit; ii. Delays in payment from government and government agencies; iii. Cumbersome payment processes; iv. Bribery and corruption in the construction industry;

v. Contracts awarded on the basis of one‟s political affiliation; and vi. The processes involved in becoming a construction firm are too easy.

The council will provide a voice for the industry in general policy issues and matters which individual contractors lack the capacity to address. The Council will act as an intermediary between the construction industry and the government whilst providing an advisory service to the government. It will provide leadership and facilitate the establishment of relevant bodies as required.

2. Training programmes for Contractors

To address the causes of underperformance among Ghanaian contractors, it is proposed that general education on project management in the Ghanaian construction industry be increased. This can be achieved through the introduction of both short and longer duration courses in Construction Project Management. Programmes should be initiated by professional bodies within the industry and academic training institutions such as the Department of Building Technology at the Kwame Nkrumah University of Science and Technology (KNUST). The training programmes for contractors should address problems identified in this study as affecting the performance of Ghanaian contractors such as:

i. Inability to compete in competitive bidding processes; ii.
Lack of capacity to compete with foreign owned firms;

iii. Personnel issues e.g. motivation and experience of staff;

iv. Inadequate supervision of projects;

v. Poor preparation for projects e.g. project planning; vi.
Revision of bills of quantities during project implementation; and

vii. Low technology available to construction firms.

Training and educational programmes should target proprietors and managers of construction firms with training on contemporary management methods, new, innovative and emerging technologies in the construction industry.

In addition to targeted training to develop project management skills, specialised training and education on the CSFs, the KPIs and Benchmarking Framework for Ghanaian contractors developed in this study will develop their capacity of Ghanaian contractors to implement programmes to integrate the CSFs and KPIs in their operations.

3. Contractor Partnerships

To address the problem of low workloads, it is recommended that Ghanaian contractors form partnerships with other local contractors to bid for projects. Synergies developed in such partnerships will also enhance their chances in competitive bidding –both local and international competitive bidding. Under this proposal, any number of contractors from two (2) to a maximum of ten (10) may form a partnership with a common administrative unit to bid for projects. Members of the contractor partnerships will pool their resources together in bidding efforts. Depending on the regions where projects are sited, the appropriate members of the syndicate will undertake the project with other members providing logistic support when needed.

4. Centre of Excellence for Construction (CEC)

It is proposed that an independent body, the Centre of Excellence for Construction (CEC) be established to manage the performance measuring system developed in this study. The centre will among other roles collate details of projects submitted by contractors, independently verify the details submitted by the contractor using documentation and records provided by the contractor, consultant and client. The proposed CEC may be based at the Kwame Nkrumah University of Science and Technology (KNUST)‟s Department of Building Technology or as a private entity. To be successful, there must be strong collaboration between the governmental departments and ministries responsible for construction such as the Ministry of Works and Housing (MoWH), Ministry of Roads and Transport, Department of Feeder Roads and the Highway Authority as well as Contractor associations with support from key stakeholders such as the donor community. The proposed CEC will cross check all details submitted by contractors using project documents and in consultation with consultants and clients. Where decisions regarding specific projects are not agreed, it is proposed such projects should be excluded from the records.

5. Government loan guarantees and incentives for banks lending to contractors It is proposed that the government of Ghana sets up a loan guarantee scheme for the construction sector. The scheme will provide security to banks for lending to contractors. In the event of defaults by the contractor, the fund will pay the contracted loans. Under this scheme, measures will be put in place to ensure responsible lending and that contractors paid back contracted loans. The guarantee fund will reduce the risk and exposure of banks and thus help reduce interests charged contractors for borrowing for projects. An alternative to this is to provide sovereign guarantees to back local contractors. This facility could be used to underwrite international finance for contractor groups for infrastructure and housing development. For projects to be developed using the

Project Finance system of financing under which projects will be financed using income generated from the sale or use of the facility or parts thereof. Groups of contractors represented by recognised professional bodies will be able to source international finance backed by such sovereign guarantees.

It is proposed that the government provides incentives for banks which lend to contractors. This could include tax rebates and other financial incentives to banks which lend to contractors. Incentives could be tied to total lending to encourage banks to lend more. Additional incentives could be based on the interest rates provided to contractors.

6. Developing the housing market through an improved mortgage regime

This study showed that the large housing deficit in Ghana offers opportunities which will both address the shortfall in the housing stock, lower house prices and boost contractor turnover and profitability. It is proposed that the government establishes a Mortgage Guarantee Fund which will be used to underwrite mortgage lending. Under the scheme, banks will be reimbursed any losses arising from loan defaults in instances where banks were unable to sell-on repossessed property. This will reduce the risks associated with housing lending enabling banks to lend at lower interest rates for longer durations. Banks will also be encouraged to provide 100% mortgages for suitably qualified customers. Finally, it is proposed that contractors facilitate the mortgage application process by liaising with banks or by sourcing their own funds and lending on to customers.

7. Common KPIs, Project and Contractor Database for Ghanaian Contractors To promote benchmarking and performance measurement in the Ghanaian construction industry, it is proposed that a set of common KPIs be adopted by stakeholders within the

Ghanaian construction industry. Industry averages will be established for the respective KPIs with Ghanaian contractors encouraged to use these KPIs to measure their performance and compare their performance against industry averages. To enhance the process of contractor selection, it is proposed that a national database on all public projects be developed with details of cost, time and quality performance of contractors. Private sector clients may add details of their projects on a voluntary basis. For public projects, data should be collected mandatorily through reports prepared by project consultants with contractors able to submit verified private projects for inclusion. The database can be used to determine contractor competence during the contractor selection process for projects.

8. Project Financing for Public Sector Projects

One of the major problems identified as affecting Ghanaian contractor performance is delayed payments to contractors. This restricts contractor cash flow, leads to project delays and may lead to abandoned projects which rid the client of the opportunity to use the facility. Delays to project implementation may result in escalating project costs owing to high inflationary trends and changes in material prices. Where projects are prefinanced by banks, delays in payment to contractors affect banks‟ capitalisation and their ability to lend funds on to other borrowers. Delay to projects arising from lack of funding can be minimised if as a policy, funding for public projects be secured and ring-fenced before projects begin.

9. Education on the PFI System of procurement

The study shows a low awareness of the Public Private Partnership- type of procurement, PFI. Whilst this is a fully developed approach to procurement in many developed countries, the study shows an apparent lack of interest amongst Ghanaian banks to finance projects which use this procurement route. It is therefore proposed that there should be increased education on the PFI system of procurement as an alternative to the mainly traditional procurement routes used in Ghana. Education should target contractors, financial institutions, policy makers and public officials to help them develop a better understanding of the system as well as the potential benefits which this system of procurement can bring to national efforts to develop infrastructure.

Also to enhance take-up in the implementation of the PFI system in Ghana, some attention needs to be paid to the development of documentation and general guidance on the efficient implementation of the PFI system of procurement as has been done in the UK where ready-to-use documentation and guidance facilitates the process of implementation of PFI projects.

9.4 RECOMMENDATIONS FOR FURTHER STUDY

1. Having explored the levels of performance amongst Ghanaian contractors and the factors which affect their performance, a Benchmarking Framework for Ghanaian contractors to aspire to World-Class Performance. To facilitate the processes leading to the attainment of superior performance, it is proposed that further review of global best-in-class contractors be undertaken to identify what constitutes superior performance in contractors.
2. It is also proposed that a major review of global best-in-class organisations be undertaken to establish what constitutes world-class performance amongst global best-in-class organisations outside the construction industry.

3. It is proposed that further research be undertaken to explore what effect best-practices have on superior performance and whether there are generic best practices which will consistently yield superior performance.
4. Having established what constitutes world-class performance is both within and outside the construction industry, it is proposed that a set of benchmarks be developed which can be used by Ghanaian contractors to benchmark their performance and target improvements.
5. To enable the effective use of the benchmarking framework developed for Ghanaian contractors, it is proposed that further research be conducted to explore the development of sub criteria for both the CSFs and KPIs. Also future research may explore the relative importance of the factors identified in this study to establish if any of the factors have a greater capacity than others to improve performance and the relative contributions of the respective CSFs to improving performance. This will lead to the development of weightings for the respective CSFs to be used to develop an

   Index which expresses World-class Construction Performance as a function of the CSFs. Further work needs to be undertaken to establish the nature of correlation (if any) between the respective CSFs.

   Further work may explore if there is causality between the CSFs and KPIs and which pairs of CSFs and KPIs are related if any. If present, the nature of the causality will be explored.

6. It is suggested that graphs be developed for all the KPIs developed in this study to simplify the process of measuring and comparing performance of contractors. Based on performance levels of the best-in-class Ghanaian contractors, these graphs will help

Ghanaian contractors to easily compare their performance with benchmark organisations.

7. It is proposed that further study be conducted to develop methods for measuring the qualitative indicators in the KPI suite developed in this study
8. It is proposed that further study be undertaken to develop a training programme for Ghanaian contractors which enables them to implement the benchmarking framework in their companies.

CONCLUSION

This research commenced with an appraisal of performance levels in the Ghanaian construction industry. Following a preliminary survey of the Ghanaian construction industry, the performance of the respondent Ghanaian contractors was compared with that of selected UK performance establish the gap in performance. A review of relevant literature covered the concepts of performance, performance measurement, benchmarking, benchmarking frameworks and associated themes. Following the review, a benchmarking framework was developed for Ghanaian contractors. The framework, the first of its kind in the Ghanaian construction industry will facilitate the benchmarking process amongst Ghanaian contractors. An implementation model was developed to facilitate the use of the benchmarking framework. The critical success factors and a suite of key performance indicators have been developed for Ghanaian contractors which have been incorporated into the benchmarking to enhance its usability. Finally a performance measurement system has been developed for Ghanaian contractors. The system comprises two tools – the Project Scorecard (ProScor) which is used for measuring contractor performance on projects and the Contractor Scorecard (ConsCor) which measures contractor organisational performance.

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APPENDICES

APPENDIX 1 – IDENTIFICATION OF MOST POPULAR CSFS

Most popular CSFs

EXISTING FRAMEWORKS / MODELS COMPARED					
EFQM	**Bassioni (2004)**	**De Waal (2007)**	**Egan 1998**	**Kosikela (1992)**	**Petersen (1999)**
Leadership and Constancy of Purpose	Leadership	Organisational design	Committed leadership	Reduce non value-adding activities	Leadership System
People	Customer & stakeholder focus	Strategy	A focus on the customer	Increase output	Impact on system
Policy	Strategic management	Process Management	Integrating process and team around product	Reduce variability	Information and analysis
Partnerships and Resources	Information and analysis	Technology	A quality driven agenda	Reduce cycle time	Strategy and policy planning
Processes	People	Leadership	Commitment to people	Simplify	Resources
People Results	Partnerships	Individual roles		Increase flexibility	Customer management and satisfaction
Customer Results	Suppliers	Culture		Increase process transparency	People management
	Process management	Behaviour of Organisational Members		Focus on complete process	Process management
	Physical resources			Build continuous improvement into process	Performance and management of suppliers / partner
	Intellectual capital.			Balance flow with conversion improvement	Business results
	Risk			Benchmark	
	Work culture				

Most popular CSFs

EXISTING FRAMEWORKS / MODELS COMPARED				
Munro-Faure & Munro Faure (1992)	**Deming's 14 Points**	**Oakland's steps to TQM**	**Crosby's 14 steps**	**Christopher and Thor, (2001)**
Understanding customer	Create constancy of purpose	Implementation	Management commitment	Vision
Understanding the Business	Zero defects	Training	Quality improvement team	Outcomes
Continuous Quality improvement	Statistical control	Teamwork	Measurement	Customer value
Quality Management Systems	Statistical evidence of quality	Control	Cost of quality	Goals
Quality Tools	Constantly improve product/service	Capability	Quality awareness	Measures
	Training	Systems	Corrective action	Empowerment
	Proper tools for employees	Design	Zero defects (ZD) planning	Teamwork
	Communication and productivity	Planning	Employee education	Continuous improvement
	Teamwork	Measurements (costs)	ZD day	Innovation
	Eliminate posters / slogans	Organisation	Goal setting	Excellence
	Constantly improve quality and productivity	Commitment and policy	Error-cause removal	Learning and knowledge
	Eliminate barriers to pride in workmanship	Understanding	Recognition	Systems
	Ongoing re-training		Quality councils	Recognition and celebration
	Top management commitment to quality		Do it over again	Sharing
				Change

Mostpopular CSFs

EXISTING FRAMEWORKS / MODELS COMPARED				
Baldridge award	**Deming Award**	**Deros et al, (2006)**	**Six Sigma**	**McDonald et al., (2002)**
Leadership	Policy	Top management leadership	Identify core processes and key customers	Leadership
Strategic Planning	Organisation and its management	Resources management	Define customer requirements	Customer focus
Customer and Market Focus	Education and dissemination	Business results	Measure current performance	Policy and Strategy
Measurement, Analysis and Knowledge management	Collection, dissemination and use of information on quality	Systems and processes	Prioritise, analyse and implement improvements	Information and analysis
Workforce Focus	Analysis	Creativity and innovation	Integrate Six Sigma system	HRM
Process Management	Standardization	Human resource management		Process Management
Results	Control	Policy and strategic planning		Business results
	Quality assurance	Customer satisfaction		
	Results	Employee satisfaction		
	Planning for the future	Organisational culture		

Mostpopular CSFs

		Work environment		

EXISTING FRAMEWORKS / MODELS COMPARED			
Liker (2004)	**Schonberger (1986)**	**Hayes and Wheelwright (1984)**	**Kasul and Motwani (1995)**
Long term philosophy	Getting to know the customer	Workforce skills and capabilities	Management commitment
Process flow	Decreasing work in process	Management technical competence	Quality
Pull systems	Cutting flow time	Competing through quality	Customer service
Level out Workload	Reduce set-up / changeover time	Workforce participation	Vendor / material Management
Stop when there is a quality problem	Shortening flow distance and space	Rebuilding manufacturing engineering	Advanced technology
Standardize	Increasing the make / deliver frequency for each required item	Incremental improvement approaches	Facility control
Visual controls	Reducing the number of suppliers to a few good ones		Flexibility
Reliable technology	Cutting number of parts		Price/cost leadership
Grow leaders who live the philosophy	Make it easy to manufacture product without error		Global competitiveness
Respect, develop and challenge your people and teams	Arranging the workshop to eliminate search time		
	Getting to know the customer		
Respect, challenge and help suppliers	Cross-training for mastery of more than one job		
	Recording and retaining production, quality and problem data at the workplace		
Continual organisational learning through Kaizen	Have plural rather than singular workstations, machines and lines for each producer		
	Automate incrementally		
Go see for yourself to	Make line people attempt problems before staff experts		

Mostpopular CSFs

thoroughly understand the situation	Maintain and improve existing workforce and machines before considering new ones		
Consensus decision making	Use simple, movable and cheap equipment		

EXISTING FRAMEWORKS / MODELS COMPARED			
Pricewaterhouse Coopers Global Best Practices	**The Xerox Model**	**Dahlgaard-Park and Dahlgaard (2007)**	**Fang and Kleiner (2003)**
Understand markets and customers	Management leadership	Problem solving	Japanese values / philosophy
Develop vision and strategy	Human resource management	People and partners	The Toyota Production System
Design products and services	Business process management	Process	Corporate structure
Market and sell	Customer and market focus	Philosophy	The hiring process
Produce and deliver products and services	Information utilization and quality tools		Teams
Produce and deliver for service oriented organizations	Business results.		Open communications
Invoice and service customers			Non-monetary awards
Develop and manage human resources			Pay/bonus system
Manage information resources and technology			
Manage financial and physical resources			

Mostpopular CSFs

Manage environmental, health, and safety issues			
Manage external relationships			
Manage improvement and change			

EXISTING FRAMEWORKS / MODELS COMPARED			
Zairi (1994)	**Hodgetts et al. (1994)**	**McKinsey's 7-S framework**	**Gilgeous and Gilgeous (1999)**
Processes	Customer-based focus	Structure	Innovation and change
Organisational structures	Continuous improvement	Strategy	Empowerment
Management systems	Fluid, flexible or virtual organisations	Systems	The learning organisation
Human factors	Creative human resource management	Shared values	Customer focus and commitment
Strategic approaches	Egalitarian climate	Skills	Commitment to quality

Mostpopular CSFs

	Technological support	Staff	First rate management team / belief in organisation
		Style	Technology and information systems
			Win-win relationships with suppliers

APPENDIX 2 SCORING AND RANKING OF CSFS

Frequency of occurrence of critical success factors (CSFs) and ranks

Critical Success Factors (CSFs)	**Frequency**	**Rank**	**CSFs in Rank Order**	**Rank**
Leadership and vision	24	1	Leadership and vision	**1**
Customer focus	14	6	Lean principles / Continuous improvement	**2**
Strategy	11	9	People / HRM	**2**
Measurement / Information and analysis / Knowledge management	15	5	Management of processes	**4**
Partnerships and Management of suppliers	13	7	Measurement / Information and analysis / Knowledge management	**5**
People / HRM	20	2	Customer focus	**6**
Management of resources	5	16	Partnerships and Management of suppliers	**7**
Technology	8	10	Quality / Zero defects	**8**
Results	8	10	Strategy	**9**
Work culture and environment	7	12	Technology	**10**
Management of processes	16	4	Results	**10**
Innovation and Creativity	6	14	Organisational design	12
Teamwork	6	14	Work culture and environment	**12**
Quality / Zero defects	12	8	Innovation and Creativity	**14**
Organisational design	7	12	Teamwork	**14**
Lean principles / Continuous improvement	20	2	Management of resources	**16**

APPENDIX 3 KPI GROUPS COMPARED

UK Construction KPIs (*Source:* www.constructingexcellence.org; *Accessed: 24 /04/09*)

New-Build KPIs (Housing)	**R& M and R KPIs (Non-Housing)**	**New-build KPIs (Non-Housing)**	**R& M and R KPIs (Housing)**
Client Satisfaction	Client Satisfaction Cost	Client Satisfaction	Client Satisfaction
Cost	Time	Cost	Cost
Time	Defects	Time	Time
Defects	Predictability	Defects	Defects
Predictability	Productivity	Predictability	Predictability
Productivity	Profitability	Productivity	Productivity
Profitability	Safety	Profitability	Safety
Variance	Variance	Safety	Variance
		Variance	

Infrastructure (KPIs)	**Housing KPIs**	**Respect for People KPIs**	**Environment KPIs**
Client Satisfaction	Client Satisfaction	Employee Satisfaction	Commercial Vehicle movement
Cost	Cost (rent loss)	Equality and Diversity	Energy Use
Time	Productivity	Investors in People	Impact on Biodiversity
Defects	Profitability	Pay	Impact on the Environment
Predictability	Quality / defects	Qualifications and Skills	Mains Water Use (construction)
Productivity	Resident satisfaction	Safety	Waste
Profitability	Safety	Sickness Absence	Area of Habitat Retained
Safety	Time to re-let	Staff Turnover	Energy Use
Variance		Training	Impact on Biodiversity
		Travelling Time	Impact on the Environment
		Working Hours	Mains Water Use (Designed)
			Whole Life Performance

M and E Contractors KPIs	**Consultants KPIs**	**Repairs KPIs**	**Construction Products KPIs**
Client Satisfaction Contractor Satisfaction Defects Environmental Impact of installation Predictability Productivity Profitability Safety (Air) Training	Client Satisfaction Productivity Profitability Training	Client Satisfaction Cost Time Defects Predictability Productivity Profitability Safety Variance	Customer Satisfaction Energy Consumption Packaging Management Transport Movement Waste reduction Water Usage Equality and Diversity People Qualifications Safety at work Sickness Absence Training

KPI Groups Compared

Sousa et al., (2006)	Bond, (1999)	Salaheldin, (2009)	Tangen, (2003),	BNQP, 2008
Productivity	Quality;	Cost reduction	Financial	Product reliability
Quality performance	Delivery reliability	Waste reduction	activity based costs	on-time delivery
Financial	Customer satisfaction	Improving the quality of products	productivity measures	customer-experienced defects level
Innovation	Cost	Improving flexibility	non-cost performance measures	service response time
Employee learning	Safety	Improving the delivery performance	cost measures	customer retention
Performance-customer	Morale	Revenue growth	quality measures	customer survey results
Requirements-customer		Net profits	speed measures	returns on investment
Satisfaction-customer		Profit to revenue ratio	dependability measures	value added per employee
		Return on assets	flexibility measures	debt-to-equity ratio
		R & D Investments		returns on assets
		Capacity to develop a competitive profile		performance to budget
		New products development		amount in reserve funds
		Market development		cash-to-cash cycle time
		Market orientation		profitability and liquidity measures
				market gains
				cycle time
				Productivity
				waste reduction

				workforce turnover
				workforce crosstraining rates
				regulatory compliance
				fiscal accountability
				Community involvement
				Complaints

KPI Groups Compared

Scottish KPIs	**Egan (1998)**	**KPIs Working Group (2000)**	**UK Construction Industry (Overall)**	**Proposed Ghanaian Contractor KPIs**
Product	Capital cost	Time	Customer satisfaction	Client satisfaction
Service	Construction time	Cost	Cost	Cost
quality	Predictability	Quality	Time	Time
Time	Defects	Client satisfaction	Contractor satisfaction	Quality
Cost	Accidents	Client changes	Defects / quality	Health and safety
Safety	Productivity	Business performance	Predictability	Business performance

Environment	Turnover & profits	Health & safety	Profitability	Productivity
People			Health & safety	Predictability
Business			Variations	People
				Environment

APPENDIX 4 – PAPER PRESENTED AT COBRA 2008 Paper presented at the Construction and Building Research (COBRA) Conference held at the Dublin University, Dublin, September 4-5, 2008

A conceptual benchmarking framework for world-class performance in Ghanaian construction firms

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Abstract

World-class companies are able to emulate and surpass the best international companies in their field and use world-class techniques. Construction companies which want to compete at world-class level must have a competitive edge for survival in the global market. Benchmarking provides information on world-class performance requirements and this can be used by Construction companies to improve their performances. The research aims at developing a cost effective framework which can be used by construction companies in Ghana to measure their performance and to benchmark their performance for continuous improvement towards world-class standards. Existing frameworks, models and programmes for improving business performance are reviewed. The paper identifies the weaknesses of these frameworks and explores a conceptual benchmarking framework which enables construction companies to measure and benchmark their performance. The paper concluded by establishing a system for implementation for the conceptual benchmarking framework to be developed.

Keywords: Benchmarking, Framework, Ghana, World-Class, Performance

APPENDIX 5 – PAPER PRESENTED AT PROBE 2009 Paper presented at Postgraduate Researchers Conference (PROBE 2009), Glasgow Caledonia University, Scotland

KEY PERFORMANCE INDICATORS FOR ENABLING WORLD-CLASS PERFORMANCE BY GHANAIAN CONSTRUCTION FIRMS

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Abstract

Performance measurement is the first step in any performance improvement programme. It helps to identify gaps in performance, opportunities for improving performance and to develop programmes for continuous improvement. This helps in setting clear, measurable and quantifiable goals and performance indicators to help improve performance. In the construction industry, Key Performance Indicators (KPIs) can be used to measure performance for both projects and organisations. If Ghanaian contractors can attain world-class performance, KPIs can provide a systematic set of performance measures which can be used to identify trends in performance, plan for and introduce changes for improved performance. KPIs will also help compare the performance of Ghanaian contractors with best-in-class organisations and provide benchmarks for attaining world-class performance. This paper explores the development of a set of KPIs for the Ghanaian construction industry. Key literature relating to the subject and existing KPIs used in other industries are reviewed. The most important performance indicators are identified. The paper reviews the performance of the best-in-class organisations in these performance measures and concludes with a proposed set of KPIs for the Ghanaian construction industry. 10 KPIs are proposed - client satisfaction, cost, time, quality, health and safety, business performance, productivity, predictability, people and environment - which can be used by Ghanaian contractors to measure and benchmark performance.

Keywords: Benchmarking, Ghana key performance indicators, performance indicators, performance measures.

APPENDIX 6-PUBLICATIONS ARISING FROM THIS RESEARCH

1. Paper presented at the Construction and Building Research (COBRA) Conference held at the Dublin University, Dublin, September 4-5, 2008.

   A conceptual benchmarking framework for world-class performance in Ghanaian construction firms

2. Paper presented at Postgraduate Researchers Conference (PROBE 2009), Glasgow Caledonia University, Scotland

Key performance Indicators for Ghana Enabling World-Class Performance in Ghanaian Construction Firms

3. **Factors Affecting Ghanaian Contractor Performance** –Published in Proceedings for the CIB W107 2014 International Conference (pp.275-285). Lagos: International Council for Research and Innovation in Building and Construction
4. **Critical Success Factors for Improving Ghanaian Contractor Performance** – Accepted for publication in Benchmarking – An International Journal

PAPERS UNDER DEVELOPMENT

1. A cost-effective benchmarking framework for Ghanaian contractors –
2. Key performance indicators for enabling world-class performance amongst Ghanaian contractors.
3. Performance measurement system for Ghanaian contractors.
4. Towards an industry development board for the Ghanaian construction industry.

APPENDIX 7 – CONTRACTOR QUESIONNAIRES ENABLING WORLD-CLASS PERFORMANCE IN GHANAIAN CONSTRUCTION FIRMS: A FRAMEWORK FOR BENCHMARKING PHD RESEARCH QUESTIONNAIRE CANDIDATE: JOSEPH K. OFORI-KURAGU, DEPARMENT OF BUILDING TECHNOLOGY, KWAME NKRUMAH UNIVERISTY OF SCIENCE AND TECHNOLOGY, KUMASI.

Thank you very much in advance for taking time to complete this questionnaire. Any answers provided in this research will be used only for academic purposes to develop a benchmarking framework and implementation model for Ghanaian construction firms. Your contribution to this process is greatly appreciated.

1.Which of these best describes your company?

a. Contractor b. Consultant c. Materials Supplier d. Financial Institution e. Government Regulator f. Academic g. Industry / Trade Association h. Other (please specify)..

2. How many people does your company employ?

   A. Less than 10 B. 11 to 50 C. 51 to 200 D. 201 to 500 E. More than 501

3. How many of your full-time technical staff have a university level qualification e.g. Architects, Engineers, Quantity Surveyors, Mechanical / Services Engineers? ....

4. How would you describe you company? As a: A. Local company B. As a Regional Company C. As a Local / Regional representative of a National Company D. Local / regional representative of a national association or corporation E. Multinational
5. How many of your last three (3) projects were government projects?
   i. All three (if you select this answer, please go to Qu. 7 ii. Two out of three iii. Only one iv. None of them
   v. As a company policy, we do not undertake government projects
6. How many of your last three projects were projects commissioned by private clients? i. All three ii. Two out of three iii. Only one iv. None of them
   v. We only undertake government projects

7. How many of your last three projects were speculative projects initiated by your firm?
   i. All three ii. Two out of three iii. Only one iv. None of them
   v. We only undertake government projects
8. How many real estate houses did your firm complete in the last year (2010)?
   i. More than 50
   ii. 25-50
   iii. 10 to 24
   iv. 1-9
   v. None (if you choose this answer, please go to Qu. 14)
9. How quickly were the last batch of property you developed sold out within the?
   i. Completely sold out even before they were completed
   ii. 50% sold before completion
   iii. We only start construction after a confirmed order with some payment iv. Most of them were sold after they were completed v. We only start selling once houses are completed
10. How long from the time of initial contact by the customer does it take you to deliver the completed house?
    i. Property are usually available for immediate occupancy
    ii. Between one (1) and six (6) months iii. Between seven (7) and eleven (11) months iv. Between twelve (12) and twenty four (24) months
    v. Depends on schedule of payments made by the client

11. Does your company have shops / show houses where prospective customers can sample your products? Yes / No
12. Does your company offer finance facilities for prospective customers? Yes / No 13. Can customers buy your products with 100% mortgage finance? Yes / No 14. What is the main source of finance for your projects?
    i. Government
    ii. Private clients
    iii. Money advanced by prospective customers iv. Banks
    v. Own sources
15. How often do you borrow from banks and other financial institutions for projects?
    i. Always
    ii. Most of the time iii. Sometimes
    iv. Very rarely v.
    Never
16. What sort of collateral do banks require from construction firms? **…………………..**

17. How easy is it for your firm to access bank finance?
    i. Very easy. We use credit from banks for all projects ii.
       We can get bank credit most of the time
    iii. We only sometimes get bank credit
    iv. We only rarely can get bank finance
    v. We have never been successful with a bank
18. On a scale of 1 to 5, please indicate how the following factors affect the ability of construction firms to access credit from banks and other financial institutions. (where 1 represents “has no effect” and 5 means “has a strong effect”)

Factor	**1**	**2**	**3**	**4**	**5**
Construction firms lack collateral					
Most construction firms do not pay back contracted loans					
Interest rates are too high and thus bank loans are not attractive to construction firms					
Bank loans are not suitable for construction					
Profit margins in the construction industry are low so construction firms do not earn enough to pay back loans					
The government does not pay contractors on time to enable them to repay back their loans					
Construction firms lack the personnel to successfully manage projects funded with loans					

Others (please specify:					

19. How do you rate the general standard of completed projects and practices across the Ghanaian construction industry as a whole on a scale of 1 to 5? Where 1 is Very poor and 5 is Worldclass? Please circle ONE of the following choices:
    i. 1
    ii. 2
    iii. 3
    iv. 4
    v. 5
20. To what extent do the following problems affect the success of construction firms and projects within the Ghanaian construction industry? on a scale of 1-5? (Where 1 is "No effect on performance", 5 is "seriously affects performance" Tick "N" if you are unsure.

Description of Problem	**1**	**2**	**3**	**4**	**5**	**N**
Poor access to credit						
Delays in payment from government and government agencies						
Cumbersome payment processes						
Inability to compete in competitive bidding processes						
Lack of capacity to compete with foreign owned firms						
Personnel issues e.g. motivation and experience of staff						
Low workloads						

Bribery and corruption in the construction industry						
Low technology available to construction firms						
Inadequate supervision of projects						
Poor preparation for projects e.g. project planning						
Revision of bills of quantities during project implementation						
Contracts awarded on the basis of one‟s political affiliation						
The processes involved in becoming a construction firm are too easy						

21. How relevant are the following factors to the success of construction firms or their projects, on a scale of 1-5? (1 is Not Relevant and 5 is Highly Relevant. Please tick "N" if unsure).

Factor	**1**	**2**	**3**	**4**	**5**	**N**
Effectiveness of Leadership and vision						
The implementation of Lean principles / Continuous improvement programmes						
Motivation and involvement of People / effective Human Resource Management Policies						
Effective Management of processes e.g. procurement, supply chain, project and construction processes						
Measurement , analysis and management of both project and organisational data, information and Knowledge						
A focus on Customer / client satisfaction						
Effective Partnerships with suppliers Management of supplier relationships						
Quality / A Zero defects culture						

Effective Strategy						
Technology: The use of advanced I.T and the relevant / modern equipment						
A focus on Results: Project and Organisational Results						
Organisational design e.g. management structure and relationships amongst organisational members						
Developing a Work culture and environment which promotes harmony and optimum output						
Promotion and the integration of Innovation and Creativity						
Promoting Teamwork within the organisation and with external parties						
Management of resources e.g. finances, equipment, materials.						

22. On a scale of 1 to 5 (1 is very low and 5 is Excellent), how do you rate the following performance indicators in terms of importance to Ghana"s construction industry? Please use the spaces provided to add any additional indicators which you think are relevant to the Ghanaian construction industry.

	1	**2**	**3**	**4**	**5**
Client satisfaction					
Cost					
Time					
Quality					
Health and safety					
Business performance					
Productivity					
Predictability					
People					
Environment					

Others (please specify:					

Thank you very much for your time completing this questionnaire. For any enquiries relating to the questionnaire, the research, its findings or to request a copy of the findings of this survey, you may contact the researcher by phone on 0246183736, by e-mail: kofori-kuragu.feds@knust.edu.gh or kokuragu@yahoo.com or by post: Department of Building Technology, KNUST, PMB, University Post Office, Kumasi, Ghana

APPENDIX 8 – QUESTIONNAIRE FOR FINANCIAL INSTITUTIONS

ENABLING WORLD-CLASS PERFORMANCE IN GHANAIAN CONSTRUCTION FIRMS: A FRAMEWORK FOR BENCHMARKING PHD RESEARCH QUESTIONNAIRE CANDIDATE: JOSEPH K. OFORI-KURAGU, DEPARMENT OF BUILDING TECHNOLOGY, KWAME NKRUMAH UNIVERISTY OF SCIENCE AND TECHNOLOGY, KUMASI.

Thank you very much in advance for taking time to complete this questionnaire. Any answers provided in this research will be used only for academic purposes to explore the factors affecting access by Ghanaian construction firms to finance. Your contribution to this process is greatly appreciated. The questions are as follows:

1. Do you finance construction projects? Yes / No?

   If you answered no, please go to question 4.

2. On a scale of 1 to 5, please rate the volume of finance you provide to construction firms,

   Where 1 represents “little or no support to construction firms” and 5 is “substantial support for construction firms”.

i.1 ii. 2

iii. 3 iv. 4 v.

5

3. What sort of interest rates do you have for construction firms?

i.5 -15% ii.

15.1-20%

iii.

20.1 - 25%

iv.

25.1 – 30%

v. More than 30%

4. What would be a common reason for refusing to be involved in a construction project? Rate each reason on a scale of 1 to 5. Please use space provided to add any additional reasons and rate them.

Reason	**1**	**2**	**3**	**4**	**5**
Construction firms lack collateral					
Construction firms do not repay loans					
Construction firms are too reliant on government for cashflow					
Construction firms do not have experienced personnel to effectively manage loan funded projects					
Construction firms lack the relevant equipment to undertake projects					
Construction firms do not have adequate turnover					
Construction firms do not make enough profits					
Construction firms do not win enough projects to break-even					
Construction firms never present business plans					

Construction firms do not present robust business plans					
The construction industry is too heavily politicised					
A perception of widespread corruption in the industry erodes confidence in the construction industry					
It is our policy not to finance construction projects					

5. Do you provide mortgage finance? Yes / No.

   If you answered No, please go to Q. 10

6. What is the average term for mortgages provided by your firm?

   i. 1-10 years ii. 11-15 years iii. 16-20 years iv. 21-25 years

   v. Can be more than 25 years

7. Does your firm offer 100% mortgages? Yes / No

   If you answered YES, please go to Q. 9

8. Would your firm be ready to offer 100% mortgages if it increases the number of customers? Yes / No

9. On a scale of 1 to 5, please rank these projects in terms of which ones your firm would most likely finance.

	1	**2**	**3**	**4**	**5**
Government funded projects					
Projects for private sector corporate clients					
Real estate projects with advance contribution by the client					

Speculative projects (initiated solely by the contractor)					
Build-operate transfer (BOT) type projects					

Thank you very much for your time completing this questionnaire. For any enquiries relating to the questionnaire, the research, its findings or to request a copy of the findings of this survey, you may contact the researcher by phone on 0246183736, by e-mail: koforikuragu.feds@knust.edu.gh or kokuragu@yahoo.com or by post: Department of Building Technology, KNUST, PMB, University Post Office, Kumasi, Ghana

APPENDIX 9 - RESEARCH VALIDATION QUESTIONNAIRE

ENABLING WORLD-CLASS PERFORMANCE IN GHANAIAN CONSTRUCTION FIRMS: A FRAMEWORK FOR BENCHMARKING

CANDIDATE: JOSEPH K. OFORI-KURAGU, DEPT. OF BUILDING TECHNOLOGY, KNUST, KUMASI.

Thank you very much in advance for taking time to complete this questionnaire. This questionnaire is being used to validate the key outcomes of a PhD research and any answers provided in this research will be used only for academic purposes. Your contribution to this process is greatly appreciated. Many thanks.

Before you start, please kindly furnish these details about yourself and background.

1. What is your professional background?

   a. Architect b. Quantity Surveyor c. Civil Engineer d. Lecturer e. Other (please state)..

2. What is the highest level of academic or professional qualification you have?

   a. HND b. BSc. c.MSc d. PhD e. Other (Please state).............................

3. How many years have you been working in the construction industry? a. 1-

   5 years

b. 6 - 10 years
c. 11 – 15 years
d. 16 – 20 years
e. More than 20 years

4. Which of these best describes the company / organisation you work for? a.

   Contractor

   b. Consultant
   c. Government Department / Ministry
   d. Academic
   e. Industry Association
   f. Other (please specify)**..**

5. The Benchmarking Framework for Ghanaian Contractors (fig.1) has been developed for use by Ghanaian contractors to compare their performance with world-class standards using a set of pre-defined Key Performance Indicators (KPIs). It can be used tocompare performance with world-class standards, set new performance targets and generally to improve performance. Please examine the Framework below (fig. 1) and answer the questions that follow in table 1:

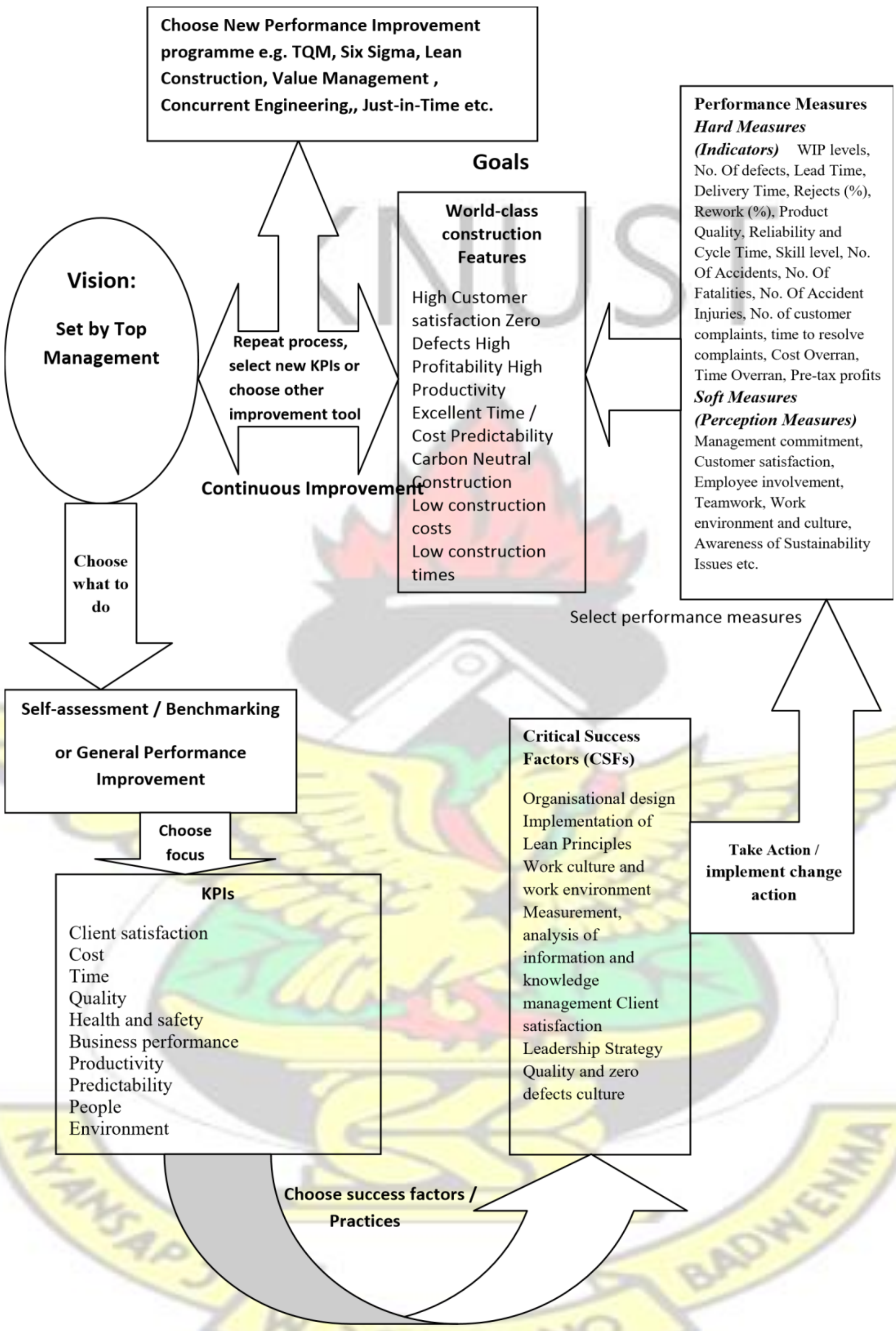

Fig. 1. Benchmarking framework for Ghanaian contractors

Please select ONLY ONE of the options from 1 to 5 where 1 represents “strongly disagree” and 5 represents “strongly agree”. Please Choose N if “UNSURE”.

Table 1. Likert scale for usability and usefulness of Ghanaian contractors’ Benchmarking Framework

Factor	1	2	3	4	5	N
The Benchmarking Framework for Ghanaian contractors is simple to use						
The terminology used in the Benchmarking Framework for Ghanaian contractors is easy to understand						
The Benchmarking Framework for Ghanaian contractors is easy to use						
The Benchmarking Framework for Ghanaian contractors makes the benchmarking process simple						
I am confident that this tool can help us improve our performance						
I will be ready to try out the Benchmarking Framework for Ghanaian contractors						

Weaknesses of the Benchmarking Framework for Ghanaian contractors

....

....

....

Suggestions for improving the Benchmarking Framework for Ghanaian contractors

I recommend that:

6. ....

7. ....

8. ....

9. **Benchmarking Framework Implementation Model** below (fig. 2) is has been developed to be used alongside the Benchmarking Framework for Ghanaian Contractors. It explains stepby-step how the Benchmarking Framework is used. Please examine the **Benchmarking Implementation Model** (fig. 2) and answer the questions that follow in table 2.

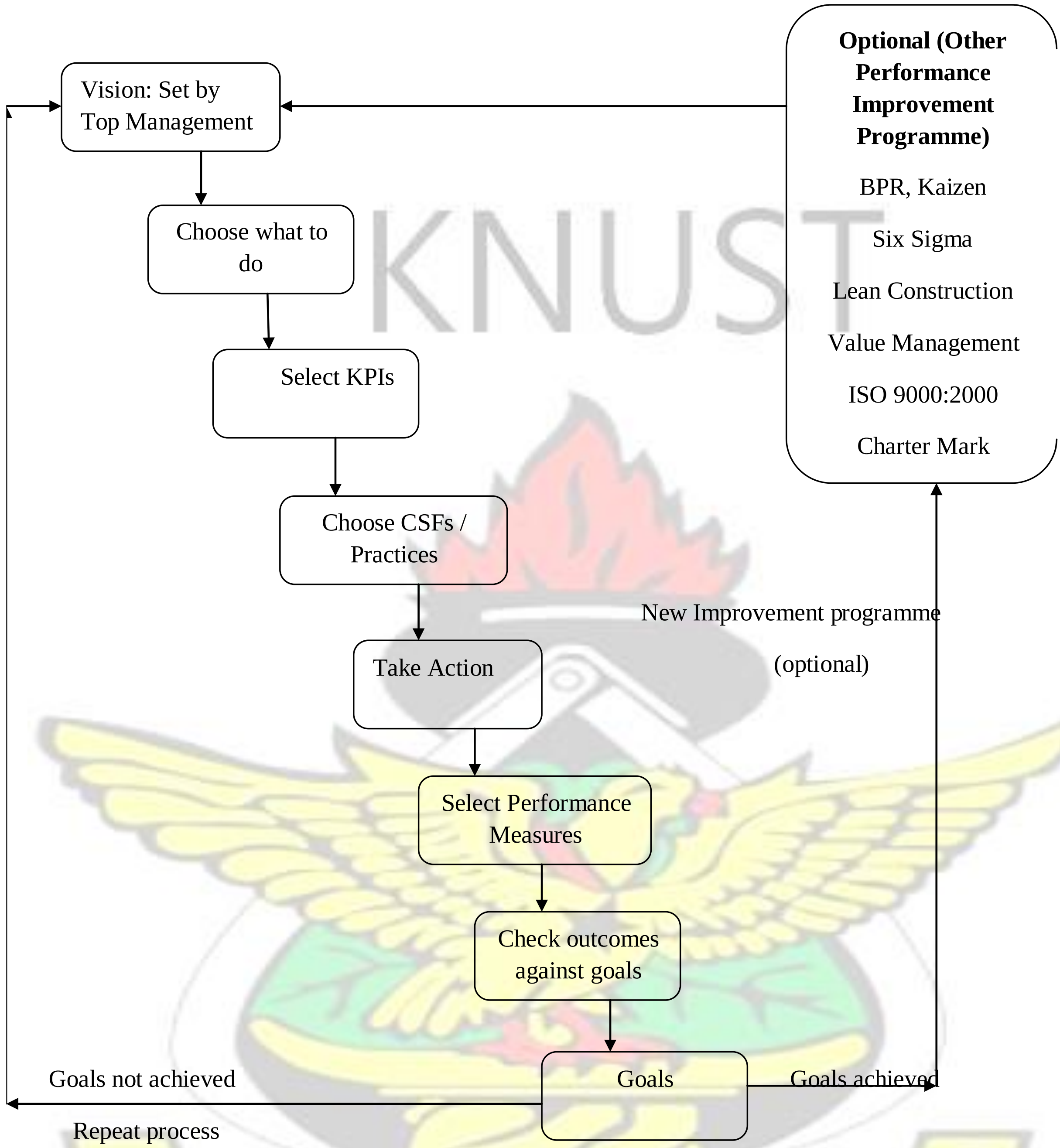

Fig. 2. Benchmarking Framework Implementation Model for Ghanaian contractors

Please select ONLY ONE of the options from 1 to 5 where 1 represents "strongly disagree" 5 represents "strongly agree". Please Choose N if "UNSURE".

Table 2. Likert scale for usability and usefulness of Benchmarking Implementation Model

Factor	**1**	**2**	**3**	**4**	**5**	**N**
The **Benchmarking Implementation Model** is simple to use						

The terminology used in the **Benchmarking Implementation Model** is easy to understand						
This tool is easy to use						
The **Benchmarking Implementation Model** makes the benchmarking process simple						
I am confident that this tool can help us improve performance						
I will be ready to try out the **Benchmarking Implementation Model**						

Weaknesses of the **Benchmarking Implementation Model**

I find that:

i. ....
ii. ....
iii. ....
iv. ....
v. ....

Suggestions for improving the **Benchmarking Implementation Model** I

recommend that:

i. ....
ii. ....
iii. ....
iv. ....
v. ....

10. The Contractor Scorecard for Ghanaian Contractors, also known as ***ConScor*** is a performance measurement tool for Ghanaian contractors. Using a set of pre-defined performance indicators, ***ConScor*** can be used by contractors, clients and other third party organisations to assess the performance of contractors in the respective performance indicators. Please examine the Contractor Scorecard (***ConScor***) for Ghanaian contractors (table 3) and answer the questions that follow in table 4.

Table 3 Contractor Scorecard for Ghanaian Contractors (*ConScor*)

CONTRACTOR SCORECARD (*ConScor*)			
Construction Company		**Financial Class**	

Project type	**Number of projects Evaluated**	**Total contract sum for evaluated projects (in millions GH¢)**	**Number of projects on which evaluation abandoned (see note)**
New build			
Repairs and maintenance			
Roads / civil works			
Performance Indicator	**Sub-criteria**		**Company average score**
Client satisfaction			
Cost			
Time			
Quality			
Health and safety			
Productivity			
Business performance	Pre-tax profit		
	Operating profit		
	Turnover		
Predictability	Cost Predictability		
	Time Predictability		
People			
Total Score			
***ConScor* Index Score**			
Note: This refers to projects on which the evaluation has been abandoned or where the parties could not agree or did not wish to participate. If there is any such project, briefly explain reasons			

Please select ONLY ONE of the options from 1 to 5 where 1 represents "strongly disagree" and 5 represents "strongly agree". Please Choose N if "UNSURE".

Table 4 Likert Scale on effectiveness of Contractor Scorecard (*ConScor*)

Factor	**1**	**2**	**3**	**4**	**5**	**N**
The Contractor Scorecard (*ConScor*) for Ghanaian contractors is simple to use						

The terminology used in the Contractor Scorecard (*ConScor*) is easy to understand						
The Contractor Scorecard (*ConScor*) is easy to use						
The Contractor Scorecard (*ConScor*) makes the benchmarking process simple						
I am confident that The Contractor Scorecard (*ConScor*) can help us improve our performance						
I will be ready to try out the Contractor Scorecard (*ConScor*)						

Weaknesses of the Contractor Scorecard (*ConScor*)

I find that:

i. ....
ii. ....
iii. ....
iv. ....
v. ....

Suggestions for improving the Contractor Scorecard (*ConScor*) for Ghanaian contractors I recommend that:

i. ....
ii. ....
iii. ....
iv. ....
v. ....

11. The Project Scorecard for Ghanaian Contractors, also known as ***ProScor*** is a performance measurement tool for Ghanaian contractors. Using a set of pre-defined performance indicators, ***ProScor*** can be used by contractors, clients and other third party organisations to assess the performance of contractors in specific projects. Please examine the Project Scorecard (***ProScor***) for Ghanaian contractors (table 5) and answer the questions that follow in table 6.

Table 5 Project Scorecard for Ghanaian Contractors (*ProScor*)

PROJECT SCORESHEET (*ProScor*)		
Construction Company		**Class:**

Project type (tick one)	**Project Description and location**	**Project start and finish dates**	**Total contract sum expressed in million GH¢**
New build			
Repairs and maintenance			
Roads / civil works			
Performance Indicator	**Sub-criteria (if any)**		**Project score**
Client satisfaction			
Cost			
Time			
Quality			
Health and safety			
Productivity			
Business performance	Pre-tax profit		
	Operating profit		
	Turnover		
Predictability	Cost Predictability		
	Time Predictability		
People			
Total Project Score			
***ProScor* Index Score**			
Is there any special event (s) which could have negatively impacted on performance on this project? Yes [ ] No [ ] If yes, please explain briefly			
Should this project be included in your performance scorecard? Yes [ ] No [ ]			
THIS SECTION FOR EXTERNAL ASSESSOR'S USE: Can the project be included in the company's project record? Yes [ ] No [ ] Please use space below for any remarks			

Please select ONLY ONE of the options from 1 to 5 where 1 represents "strongly disagree" and 5 represents "strongly agree". Please Choose N if "UNSURE".

Table 6 Likert Scale on effectiveness of Project Scorecard for Ghanaian Contractors (*ProScor*)

Factor	**1**	**2**	**3**	**4**	**5**	**N**
The Project Scoresheet (ProScor) for Ghanaian contractors is simple to use						
The terminology used in the Project Scoresheet (ProScor) for Ghanaian contractors is easy to understand						

The Project Scoresheet (ProScor) for Ghanaian contractors is easy to use						
The Project Scoresheet (ProScor) for Ghanaian contractors makes the benchmarking process simple						
I am confident that Project Scoresheet (ProScor) for Ghanaian contractors can help us improve performance						
I will be ready to try out the Project Scoresheet (ProScor) for Ghanaian contractors						

Weaknesses of the Project Scoresheet (ProScor) for Ghanaian contractors

i. ....
....

ii. ....
....

Suggestions for improving the Project Scoresheet (ProScor) for Ghanaian contractors

I recommend that:

i. ....
....

ii. ....
....

Thank you very much for your time completing this questionnaire. For any enquiries relating to this research please contact the researcher by phone on 0246183736, by e-mail: kokuragu@yahoo.com or by post: Department of Building Technology, KNUST, PMB, University Post Office, Kumasi, Ghana.