EVALUATION OF SUCCESS INDICATORS OF BUILDING CONSTRUCTION PROJECTS IN KENYA

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DECLARATION

I declare that this is my original work and has not been submitted for the award of any other university degree

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DEDICATION

To my loving Wife Beatrice Nyanchama, our children Cheryl Botongore Mokua and Baraka Mogoko Mokua

&

My parents: The late Mzee Samwel Nyariki and Mama Jane Moraa

ACKNOWLEDGEMENT

I wish to thank the almighty God for sustaining my life and all other provisions throughout my life.

I wish to also convey my gratitude to all those who assisted me in one way or another in the successful completion of my studies. I particularly acknowledge the great assistance offered to me by my supervisors: Prof. Paul Syagga and Qs. Robert Oduor. My gratitude also goes to Mr. Robert Omondi who assisted in the statistical analysis of my data. I am most indebted to the Ministry of public works for offering me a scholarship and study leave to pursue my Masters programme at the University of Nairobi. In particular, I am grateful to the chief architect and the Ministerial Training Committee for their approval of my scholarship and study leave. I am most grateful to the study participants without whom this study would not have been realised.

Last but not least, I am very grateful to my loving wife Beatrice Nyanchama for her unwavering support and encouragement during the writing of my project and to my children Cheryl and Baraka, thank you for understanding that Daddy had to keep away from you to complete his project. As to my mother and my sisters and brothers, I cannot thank you enough.

ABSTRACT

Project success means efficiency and effectiveness.Success is measured in terms of how well these objectives have been met. Traditionally, evaluation of project success has been based on the three constraints of time, cost, and quality parameters. However, there are other indicators that can determine success in constructions projects. These are; absence of legal claims and legal proceedings, meeting social obligations, good quality of work life to users, minimum effect to the environment, safety requirements, client satisfaction, project functionality, free from defects, profitability, positive reputation, development of new knowledge and expertise, lower depreciation cost, aesthetic value, low cost of maintenance, fitness for purpose, flexible for future expansion, etc.

This study therefore, set out to identify these other indicators and theirrating by the various stakeholders for both the process and the results of construction projects. It also sought to establish differences in ratings among stakeholders.

The study was done in Nairobi. A survey design was used to sample 490 stakeholders in the construction industry namely: architects, quantity surveyors, electrical engineers, mechanical engineers, civil/structural engineers, environmental impact assessment (EIA) experts, developers and members of the public/neighbour's. Questionnaires were used of which 158 (32.2%) were returned.The range of professional experience of the architects' respondents in terms of number of years in the construction industry was between 10 and 36 years with an overall average of approximately 16.46 years. A 5-point likert scale was used to rate the indicators that were divided into 13 process and 16 result indicators.

One-way sample t -test was used to determine whether the means of process and result indicators were statistically significant at $p=0.05$ probability of error. The results showed that, all indicators were generally highly rated by all stakeholders. Comprehensive briefing by the client was highest on the hierarchy followed by delivery of project within the budget, meeting safety requirements, meeting quality specifications, fast communication and decision making process, minimum effects to the environment, efficiency of approving authorities, efficiency in utilization of manpower, integration of design and construction, absence of legal claims, meeting social obligations, minimum disputes and minimum scope changes in that in that order.The results showed that none of the stakeholders had means statistically significantly deviating from the overall mean for process indicators. The mean difference for process success indicators between developers and architects, civil/structural engineers and EIA experts were statistically significant (p□0.05). While the differences between the developers and remaining stakeholders namely: quantity surveyors, mechanical engineers, electrical engineers and members of the public were not statistically significant (p□0.05). However, the mean difference between civil/structural engineers and EIA experts was statistically significant at (p□0.05).

Therefore, bearing these results in mind, early definition of success indicators is important and can ensure an undisputed view of how the project will be judged and guarantee a safe path to success.

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CHAPTER ONE: INTRODUCTION

1.0 Background Information

In the present day world, technical break-through has caused a lot of revolutions in construction. Modern construction include high rise buildings, dams and irrigation net-works, energy conversion and industrial plants, environmental protection works, infrastructural facilities like roads, bridges, railways, airports and seaports, satellite launching stations, onshore and offshore oil terminals just to mention a few (Chitkara, 2003).

The major divisions of the construction industry consist of building construction and heavy construction. The building construction division can be further divided into public and private, residential and non-residential. However, many of the largest and most spectacular constructions fall in the heavy construction area. Heavy construction includes highways, airports, rail roads, bridges, canals, harbours, dams which are most of the time public constructions, (Nunnally, 2001). Another special division of the construction industry includes industrial construction, processing plant construction, marine construction and utility construction (Chitkara, 2003).

1.1 The Construction Industry and the Economy

Construction, whether at project or at industry level, is a significant and integral part of national development (Undergren et al., 2002). According to Takin and Akintoye (2002), the construction industry is vital for the development of any nation. In many ways, the pace of the economic growth of any nation can be measured by the development of physical infrastructures, such as buildings, roads and bridges. The construction industry's other importance in the economy is that it produces investment goods. This means that it products are wanted, not for their own sake, but on account of the goods and services which they can help to create. A factory building is for instance an investment because it is used to create other commodities, (Hillebrandt, 1988).The industry can deliberately be used to affect the level of activity in the economy because of its size and its high level of employment, (Hillebrandt, 1988).

Construction industry plays a vital role in responding to social demand for housing and other related infrastructure (Hill, 1992). Construction generates more employment than most of the sectors (Chitkara, 2003). According to Chitkara (2003), in most countries, construction activity constitutes 6-9% of the gross domestic product (GDP) and constitutes more than half of the fixed capital formation as infrastructure and Public activities, capital works required for economic development.

1.2 Construction Project Successes

The concept of success in construction projects can indeed be evaluated only when the success/evaluation indicators are adequately defined (Baker et al.,1983; Slevin and Pinto 1986; Morris and Hough, 1987; and Turner, 1993).

According to Baccarini, (1999), a synonym for success is effectiveness, i.e. the degree of achievement of objectives. Projects are formed to accomplish objectives and success is measured in terms of how well these objectives have been met. Generally, in any project, the evaluation/success indicators correspond to the traditional constraints of time, cost, and quality parameters. This corroborates with findings by De wit (1988) that project success is measured against the overall objectives of the project (i.e. time, cost, quality, and project mission). However other studies have pointed out that the dimensions of project success refer to the *Efficiency* and *Effectiveness* measures under which much wider than the traditional success indicators are incorporated (Pinto and Sleven, 1994; Abdel-Razek, 1997; Nyhan et al., 1999; and Cooke-Davies, 2002),. These may include indicators like; absence of any legal claims and legal proceeding, meeting social obligations, good quality of work life to users, minimum effect to the environment, safety requirements, client satisfaction, project functionality, free from defects, profitability, positive reputation, development of new knowledge and expertise, lower depreciation cost, aesthetic value, low cost of maintenance, fitness for purpose, flexible for future expansion, etc.

1.3 Problem Statement

Traditionally in the construction industry, project success is evaluated using cost, schedule, and performance. However, thisapproach has a limitation since it considers only three aspects of success, which are at the construction process level.Yet, within the construction process alone, there are many aspects that may contribute to success, which have been left out. Additionally, projects start much earlier than the construction process and their impact lasts much longer, to meet objectives.Hence, many other aspects outside the construction process need to be considered:

Indeed, aaccording to Hillebrandt(1988), the products of construction are wanted not for their own sake, but on account of the goods and services they help create. For instance, buildings are investments because they are used, to create other commodities,for public activities, for housing andother capital works for economic development. This means, long after the construction process is over, a construction product will still be evaluated whether it's meeting objectives.

Therefore, indicators, which focus on long-term objectives, perspectives of the stakeholders (i.e. project sponsors, consultants, end-users and the community) should be considered. Hence, there's an urgent need to identify more comprehensive and inclusive quantitative and qualitative success indicators that can be utilized to assess project success in the construction industry.

1.4. Goal of the study

The main purpose of the study was to identify process and result success indicators of construction projects in Kenya.

1.5 The Specific Objectives

The study's specific objectives were to:

1. Identify the stakeholders' rating of process and result success indicators for the of construction projects.
2. Establish the differences among stakeholders' rating of process and result success indicators of construction projects.
3. To determine comprehensive success indicators of a successful project

1.6 Assumptions

The assumptions of the study were that:

1. The study population, consisting of qualified and registered design professionals by the Board of Registration of Architects and Quantity Surveyors (BORAQS) and the engineers' registration board have similar experience, perceptions and preferences.
2. These professional had consistently worked in the construction industry and not in any other field.
3. The developers sampled had the same preferences and aspirations.
4. The end user sampled had the same preferences and aspirations.

5. The community representatives sampled had the same preferences and aspirations

1.7 Limitations of the Study

The study was limited to Nairobi due to the time and financial constraints, and the fact that majority of the construction professionals are located in Nairobi. Moreover, from the list of qualified and registered professionals from the BORAQS and Engineers Registration Board (ERB), a majority of the construction industry professionals are located in Nairobi. Due to the aforementioned study limitations, generalization of the findings should be done with caution. It is also likely that the experience of the stakeholders in Nairobi may be different from those of other urban areas and construction sites.

1.8 Research justification

The greatest wish of any stakeholder in a project is to have the project completed and be put to the use it is intended successfully. For the developer a successful project may mean good returns on investment; for the consultants and contractors it may mean a satisfied client, good reputation and more business; for the project end-users it may mean functional spaces and a friendly environment; and for the community around the projects neighbourhoods it means an environment to be proud of and associated with.

The research concentrated on project success as viewed by the different project stakeholders and proposes ways of addressing these views as a way of measuring wholesome project success. Though there have been researches into project success, all the researches recommend further research into this field. Again, project success has for a long time been limited to the three goals of delivering the project within budget, time and the specifications, yet with time other criteria of project success have been developed as stakeholders get more informed and thus demand more from projects. For instance, lately all big construction and building projects in Kenya must have their likely environmental and social impacts evaluated. Implementation is allowed only when acceptable steps have been taken to mitigate any negative impacts they are likely to cause.

Moreover, there have been frequent changes in technology and introduction of new materials into the construction industry from time to time. Therefore, this makes it necessary to research on how the new technology and materials are affecting how project success is viewed.

1.9 Organization of the Research Report

The research report is organized in five chapters structured as follows;

Chapter one deals with introduction, the problem statement, assumptions, limitation of the study and organization of the research report.

Chapter two examines the theoretical background within the context of success of construction projects and the review of the literature relevant to the problem area.

Chapter three outlines the research methodology adopted for collecting primary and secondary data.

Chapter four analyzes and interprets data and discusses results from the field.

Chapter five concludes with a summary of findings and gives recommendations arising from the data analysis.

CHAPTER TWO: LITERATURE REVIEW

2.0 Success of Construction Projects

2.1 Introduction

There are many definitions of success. Various people throughout the ages have defined success, and the interesting thing about these definitions is that none of them are the same. Many of them are very general, but all of them embody something personal. Ralph Waldo Emerson(1803 - 1882) American Essayist & Poet said, *"To laugh often and much; to win the respect of intelligent people and the affection of children; to leave the world a better place; to know even one life has breathed easier because you have lived—This is to have succeeded"*.

Emerson clearly valued his success according to what other people thought of him, but he also valued his own personal sense of importance. Emerson wanted to be needed and wanted people to like him. To Emerson, success was all about the people in his life.Here success is being measured as the positive impact one has upon the lives of other people.

Other people tend to equate success with money. That is, the more money one makes the more successful. Under this definition one could argue that a drug dealer who makes millions of money annually is very successful. But the impact he has on the life of other people is actually a very negative one.

Tomlin (1973) shows us just how success is like a living creature, ever changing and providing a new challenge at a moment notice. "The road to success is always under construction," she said. Something that may be successful today could be failure tomorrow, and the reverse is also true. Success is simply hard to pin down, and you've got to be ready to change your definition of the term. Winston Churchill (1874-1965), defined success as "going from failure to failure without losing enthusiasm." This means success is simply not giving up.

Albert Einstein (1879-1955), saw success as a more general aspect of life. He said, "If A equals success, then the formula is A equals X plus Y plus Z, with X being work, Y play, and Z keeping your mouth shut." For Einstein, success was simply about accomplishing your goal. According to Einstein, the true meaning of success changes for every person according to their goals. Goals change, so of course the meaning of success will constantly change. As goals change, the meaning of success changes too. If success is achieving goals, then the specifics of success will always be different. With each new goals set, success is defined by them. Achieving goals is success, but the degree of success has to be defined.

As aforementioned, there are many definitions of success. Traditionally, it is defined as the degree to which goals and expectations are met (Frederikslust, 1998), depending on one's goals and expectations. It can be seen that success is a subjective thing, so what success means to one might be different from what it means to other people, because different people have different goals in life and this is perfectly fine.

Therefore, success has various meanings and it truly is anything you want it to be. There can be many categories of success. There can even be many ranges of success within each category. According to oxford advanced learner's dictionary 8^{th} edition (2010), success is defined as the fact that you have achieved something that you want and have been trying to do or get; or a person or thing that has achieved a good result and been successful. This definition of success may explain why the true meaning of success appears to be so elusive. Put together success is the achievement of set goals and objectives, and has positive impact in people's lives. It has also been noted that success is subjective depending on the situation, time and people.

2.2 Success in construction projects

2.2.1 Definitions

Munns and Bjeirmi (1996) consider a project as the achievement of a specified objective, which involves a series of activities and tasks that consume resources.Project success means different things to different people. Definitions of project success may change according to project type, size and sophistication, project participants and their experience, etc.

Each industry, project team or individual within the project has a definition of success. Pariff and Sanvido (1993), consider success as an intangible perceptive feeling, a measuring criterion that varies with management expectations and varies among persons and with the phases of the project. Lim and Mohamed (1999), states, "project success is normally thought of as the achievement of some pre-determined project goals", while the general public has different views, commonly based on user satisfaction and expectations.

According to Englund (2003), project success can be defined as the willingness and acceptance of management and end users to adopt the developed changes (in processes and systems), adaptability of project deliverables to accommodate to different external and internal factors and for Hyvari (2006), Project success is almost the ultimate goal for every project. He further states, success of projects is defined as the degree to which project goals and expectations are met.

According to Freeman and Beale (1992), the concept of project success is a means to improve the present situation. They further state that, however, this concept has remained ambiguously defined in the minds of the construction professionals. Many project managers still attend to this topic in an intuitive and ad hoc fashion as they attempt to manage and allocate resources across various project areas. Abraham (2003) argues that the dynamic nature of the construction industry makes the concept of project success ambiguously defined. Cleland and Ireland (2004), agrees by stating that one of the vaguest concepts of project management is project success. Since each individual or group of people who are involved in a project have different needs and expectations, it is very unsurprising that they interpret project success in their own way of understanding.In this study, success was defined as achievement of good results in aproject i.e. achieving set goals and objectives that will have positive impact in people's lives over a long time.

2.2.2 Success Indicators

The Macmillan English Dictionary for advanced learners describes an indicator as "something that shows in what condition something is". The concept and indicators of success in a construction project according to Baker et al.,(1983); Slevin and Pinto, (1986); Morris and Hough (1987) and Turner (1993), can be defined as 'the set of principles or standards by which favourable outcomes can be measured within set specification' and can be evaluated only when the evaluation dimensions are adequately known.

2.2.2.1 Traditional Success Indicators

According to Baker et al., (1983); Slevin and Pinto (1986); Morris and Hough (1987); Turner (1993), the common assessment of the success of construction projects is that they are delivered on time, to budget, to technical specification and meet client satisfaction, Hughes and Tippet (2004), agrees by stating, traditionally, the success parameters for projects in this industry are cost, time and quality.

Navarre and Schaan (1990) observed thatproject success was inherently tied to performance measures, which in turn were tied to project objectives. At project level, success was measured on the bases of time, monetary cost and project performance. He further states that, nearly every related article mentions Time, cost and quality as the basic criteria to project success and points out the importance of them in a construction project. He cites views of Walker (1995); (1996), Belassi and Tukel (1996) and Hatush and Skitmore (1997). Atkinson (1999), identified these three criteria as the 'Iron Triangle'. He further suggests that while some different definitions about project management have been made, the criteria for success, namely cost, time and quality remain.

2.2.2.2 Other Success Indicators versus traditional indicators

For Englund (2003) a project can be completed on time, under estimated costs and within scope but with the wrong level of quality, without satisfying the customers' needs and/or by misinterpreting the customers' needs and developing requirements to solve a different problem." While some writers consider time, cost and quality as predominant criteria, others suggest that success is something more complex, Hughes, Tippett, and Thomas (2004). For Chan et al., (2002), a successfully completed project is that which has achieved good results. According to them, Project success is an abstract concept, and determining whether a project is a success or a failure is highly complex, and that , the concept of project success can be evaluated through performance measures that can be developed from research literature where various success criteria can be identified.

A classic example of different perspective of successful project is the Sydney Opera House project, Thomsett (2002), which went 16 times over budget and took 4 times more to finish than originally planned. But the final impact that the Opera House created was so big that no one remembers the original missed goals. The project was a big success for the people and at the same time a big failure from the project management perspective. On the other hand, the Millennium Dome in London was a project on time and on budget but in the eyes of the British people was considered a failure because it didn't deliver the awe and glamour that it was supposed to generate, Cammack (2005). "In the same way that quality requires both conformance to the specifications and fitness for use, project success requires a combination of product success (service, result, or outcome) and project management success", Duncan, (2004). Englund (2003), states that sometimes the project can be right on scope, schedule, and resources, and still fail to be successful, perhaps because the market changed, or a competitor outdid you, or a client changed its mind. You could also miss on all constraints but still have a successful project when viewed over time, as witnessed in the Sydney Opera House in Australia.

It is possible that a "Challenged" project could be cancelled that would have met the sponsors' needs and it is also possible to identify a project that should be cancelled that is currently on time, on budget and meeting the defined needs.

According to Haponava, Al-Jibouri and Reymen (2009), the construction industry is project-based, dynamic in nature and involves many participants and stakeholders. For Atkinson (1999), a successful project must bargain between the benefits of the organization and the satisfaction of end users and other stakeholders.

The overall objective for all stakeholders is the same: they all want the project to succeed. Takim and Akintoye (2003), asserts that Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion. They further state that, the level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organisational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability. Abraham (2003), agrees with the assertion and states that the approach to success in the construction industry is to focus on the ability to plan and execute projects.

Other researchers such as Atkinson et al., (1997) and Wateridge (1998) point out that the criteria for success are much wider and they include incorporating the performance of the stakeholders and evaluating their contributions and understanding their expectations. Takim and Akintoye (2003), defines a stakeholder as an individual or group, inside or outside the construction project, which has a stake in, or can influence, the construction performance. Construction projects potentially can have different sets of stakeholders, the common ones being: the client, consultant, contractor, supplier, end-user and the community. In most Construction Project's scenarios, a group leads project as stakeholders, i.e., the project manager, team members, end users, project sponsor and top management, who then designate another individual or group, e.g. an Architect, Engineer, Quantity Surveyor who prepares the design drawings, project cost estimates and contract documents.

2.2.2.3 Process and result success indicators in building construction projects

According to Atkinson, et al., (1997), successful construction project is achieved, when stakeholders meet their requirements, individually and collectively. According to Takim and Akintoye (2003), Owners, designers, consultants, contractors, as well as sub-contractors have their own project objectives and criteria for measuring success. For example, architects may view aesthetics or functionality as the main criterion rather than building cost. However, the client may have different views. Moreover, even the same person's perception of success changes from project to project. Atkinson, et al., (1997) further state that, it is important for the stakeholders to distinguish between the 'process' and the 'result' in the life cycle of a project Songer and Molenaar (1997), advocated that a project is successful if it is achieved on budget, on schedule, conforms to users expectations, meets specifications, quality workmanship and minimize construction aggravation. Kumaraswamy and Thorpe (1996), included a variety of criteria in their study of project evaluation. These include meeting budget, schedule, and quality of workmanship, client and project manager's satisfaction, transfer of technology, friendliness of environment, health and safety.

According to Baker et al., (1983); Slevin and Pinto (1986); Morris and Hough (1987); Turner (1993), the common assessment of the success of construction projects is that they are delivered on time, to budget, to technical specification and meet client satisfaction. According to Baccarini, (1999), projects are formed to accomplish objectives and success is measured in terms of how well these objectives have been met. Criteria such as meeting project time, budget, technical specification and mission to be performed are the top priorities of project objectives. This corroborates with De wit (1988), findings that project success is measured against the overall objectives of the project (i.e. time, cost, quality, and project mission).

Pinto and Pinto (1991), opine that Apart from these three basic criteria, measures for project success should also include project psychosocial outcomes - the satisfaction of interpersonal relations with project team members. Subjective measures such as participants' satisfaction level are known as the 'soft' measures. The inclusion of satisfaction as a success measure can be found earlier in the work of Wuellner (1990). Pocock et al., (1996) further noted this measure as having 'no legal claims' as an indicator of project success. Englund (2003) states that, understanding human factors definitely help determine success. According to him, projects typically do not fail or succeed because of technical factors; they fail or succeed depending on how well people work together. He further states that when we lose sight of the importance of people issues, such as clarity of purpose, effective and efficient communications, and management support, then we are doomed to struggle. The view of Pinto and Pinto, 1991 on this is that the challenge of leaders is to create environments for people to do their best work. Kometa et al.,(1995), used a comprehensive approach to assess project success by considering safety, economy (cost), running/maintenance cost, time and flexibility to users.

According to Herbsman and Ellis (1992), OFPP (1998), Rosenbaum, Rubin, and Powers (2002), Post (1998), CIB (2000), Egan (1998), Haponava, Al-Jibouri and Reymen (2009), there have been various efforts and attempts in the construction industry to set up measures to improve the performance in the construction activities including continuous improvement, partnering, lean construction, and implementing different delivery systems. The results of such attempts have produced a number of measures and indicators for example KPI in the UK, KPI, (2000), and the construction performance measures developed by the CII in the United States, CII (2000).

The aim of many of the developed indicators in different countries was to assess the overall project performance or to measure the performance of its main activities. The UK working groups on Key Performance Indicators (KPIs) (Figure 1) have identified ten parameters for benchmarking projects in order to achieve a good performance in response to Egan's report (1998).

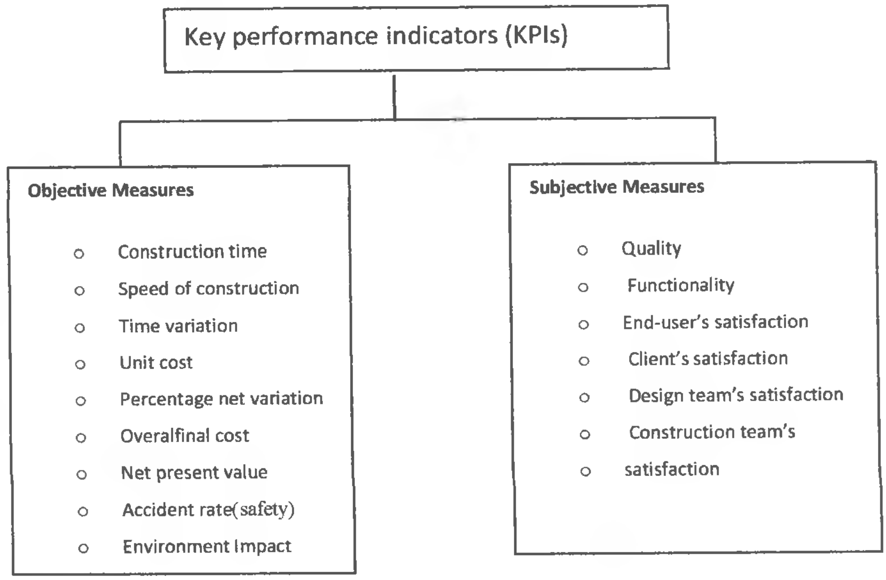

Figure 1.Key Performance Indicators for Project Success

Source: UK working group on key performance indicators (KPI, 2000).

Shenhar et al., (1997), proposed that project success is divided into four dimensions. Figure 2 shows these four dimensions that are time-dependent. The first dimension is the period during project execution and right after project completion. The second dimension can be assessed after a short time, when the project has been delivered to the customer. The third dimension can be assessed after a significant level of sales has been achieved (one to two years). Finally the fourth dimension can only be assessed three to five years after project completion.

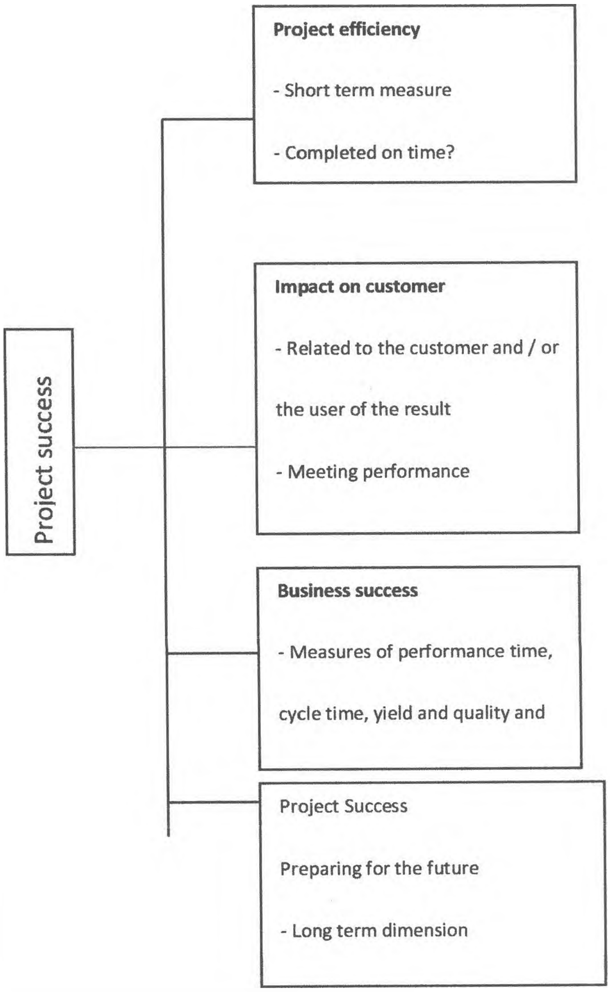

Figure 2. The four dimensions of project success

Source: Shenhar et al.,(1997).

Wideman (1996), states that the characterization of 'time dependent' is based on the fact that success varies with time. He goes on to state that it is vital to know what the project is trying to achieve after completion time so that success criteria are clearly defined in the early stages. The focus moves from the present success criteria to the future, in a way that a project can be unsuccessful during execution if it is judged by criteria like cost and quality, but in the long term it can turn to be a thriving story.

Lim and Mohamed (1999) believed that project success should be viewed from different perspectives of the individual owner, developer, contractor, user, and the general public and so on. They propose two categories: the macro and micro viewpoints of project success.

As illustrated on Figure 3 and Table 1, micro-measures are measures at the individual project level that compare actual project results with expected results as defined in specific project goals and objectives. Macro-measures often referred to as benchmarking, compare and analyze results on a broader scale. Sadeh et al., (2000), nevertheless divided project success into four separate dimensions. The first dimension is meeting design goals, it refers to the contract that was signed with the customer. The second dimension is the benefit to the end user; it refers to the benefit to the customers from the project end products. The third dimension is benefit to the developing organization; it refers to the benefit gained by the developing organization as a result of executing the project.

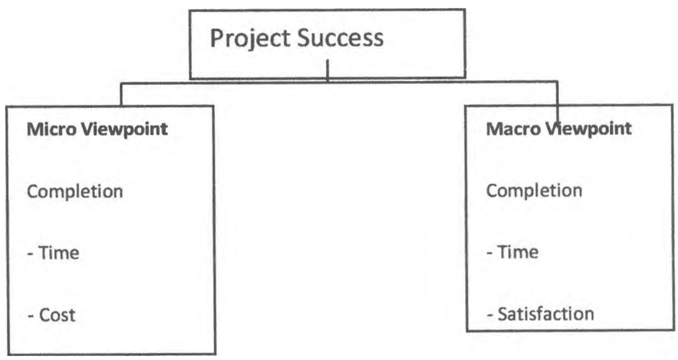

Figure 3: Micro and macro viewpoints of project success

Source: Adopted from Lim and Mohamed (1999).

The last dimension is the benefit to the national technological infrastructure, as well as to the technological infrastructure of the firm that was engaged in the development process. The combination of all these dimensions gives the overall assessment of project success.

Takim and Akintoye (2003), advocate that when considering exactly what defines a 'successful' project, it is essential to emphasise both the aspects of project outputs (efficiency) and outcomes (effectiveness). Measuring the efficiency performance of a project means measuring the efficiency of the *'processes'* in terms of strategic planning and management and utilisation of resources, which relates to the project outputs. Whereas, the effectiveness performance measures the project *'results'* in terms of accomplishing the core businesses and project objectives, users' satisfaction and the use of the project which relates to the project outcomes. According to The Construction Users Roundtable (2005), there are two general types of construction measures, Results measures, which track outcomes after the fact and In-process measures, which track leading indicators.

Table 1: Success dimensions and measures

Success Dimension	Success Measures
Meeting design goals	· Functional specifications · Technical specifications · Schedule goals · Budget goals
Benefit to the end user ·	Meeting acquisition goals · Answering the operational need · Product entered service · Reached the end user on time · Product has a substantial time for use · Meaningful improvement of user operational level · User is satisfied with product
Benefit to the developing organization	· Had relatively high profit · Opened a new market · Created a new product line · Developed a new technological capability · Increased positive reputation
Benefit to the defence and national infrastructure	· Contributed to critical subjects · Maintained a flow of updated generations · Decreased dependence on outside sources · Contributed to other projects
Overall success ·	A combined measure for project success

Source: Sadeh et al. (2000).

According to Rad and Levin (2002), the two primary objectives of project management are that the project should be effective and efficient. For Turner and Mullar (2005), Projects being successful imply projects to produce effective effects, but at other end being efficient implies producing consequences with minimum effort or the caliber to carry out actions promptly. A synonym for success, according to Baccarini (1999), is effectiveness, i.e. the degree of achievement of objectives.

According to Brudney and Englund (1982); de Wit (1988); Pinto and Slevin (1988): (1989); Smith (1998); Belout (1998); Atkinson (1999); Crawford and Bryce (2003), the concept of success in a construction project, is corresponding to the efficiency and effectiveness measures. Efficiency is broadly understood as the maximization of output for a given level of input of resources, while effectiveness is directed to the achievement of goals or objectives. Pinto and Slevin (1988): (1989), identify project success in terms of efficiency and effectiveness measures. For Atkinson (2003), Efficiency measures refer to strong management and internal organizational structures (adherence to schedule and budget, and basic performance expectations). In other words, efficiency measures deal with 'time, budget and specifications'. Effectiveness measures refer to the achievement of project objectives, user satisfaction and the use of the project. A project delivered on time, within budget, and meets performance specifications may not be well-received by the client/users for whom it is intended. The efficiency of a project would only be achieved through having a standard system and methodology put in place (George, 1968). This aligns the Smith, 1998 and Nyhan and Martin (1999), findings that project efficiency are concerned with the utilisation of equipment and workforce, whereas effectiveness is concerned with the achievement of outcomes. Maloney (1990), also asserts that the efficiency of construction projects involves the utilization of resources, which may be represented by the ratio of the resources expected to be consumed divided by the resources actually consumed. The effectiveness of a construction project, on the other hand, is when the organization's objectives are fully attained.

The above perceptions align with the views of Concerdo (1990), who proposes a model of performance measurements in terms of the final outputs and resources to be measured at different levels. Final outputs are measured to determine whether they help to accomplish objectives (effectiveness), and resources are measured to determine whether a minimum amount of resources are used in the production of the final outputs (efficiency).

Cameron and Whetten (1993), contribute to the discussion of project efficiency and effectiveness by indicating that a system is effective if it achieves its objectives. Since construction projects are directed towards client's objectives, an effective construction project should meet the client's objectives. According to Crawford and Bryce (2003), an evaluation of project success is from the efficiency and effectiveness dimensions. Project efficiency ("doing the thing right") is concerned with cost and process management (i.e. the efficient conversion of inputs to outputs within budget and on schedule) and a wise use of human, financial and natural capital. Whilst, project effectiveness ("doing the right thing") is concerned with the development of worthiness or appropriateness of the chosen project goal. A project may be efficient (i.e. implemented on or ahead of time and cost schedules) but may be ineffective if the internal logic of the project is not grounded in reality or if the goal of the project does not address what are in fact the core vulnerabilities of the target community (i.e. the initial development problem analysis was weak). Atkinson (1999), asserts that measuring project success for the process criteria for project management is measuring efficiency, while measuring effectiveness refers to measuring the success of the resultant system or organization benefits, getting something right and meeting goals. Given the above arguments, it may be said that project success must consider both the project outputs (efficiency) and *project outcomes* (effectiveness),Pinto and Slevin (1988:89); Maloney (1990); Cameron and Whetten (1993); Abdel-Razek (1997); Smith (1998); Atkinson (1999); Nyhan and Martin (1999); and Mbugua, (2000).

2.2.2.4 Overview of project success indicators

Success indicators in the construction industry are dynamic and researchers have come up with different ways of using them to evaluate success. Several researchers (Atkinson, 1999); Pinto and Slevin, 1988 and 1989; and Davies, 2002), have noted that different stakeholders value different indicators depending on their interests in the project. The indicators themselves are in fact time dependent. For instance, there are those that determine success at design stage, at implementation stage, at project handing over while others are long term. Since, there are many indicators that are considered important by different stakeholders, for the purpose of this work a few will be discussed in detail.

2.2.2.4.1 Client and User Satisfactions

Satisfaction describes the level of 'happiness' of people affected by a project, Chan et al., (2002). According to Bititici (1994), client is satisfied when the project is delivered to quality, reliability, on-time deliveries, high service levels and minimum cost of ownership. Atkinson (1999) cites that end-users will not be happy if the end product does not meet their requirements in terms of functionality and quality of service. Liu and Walker (1998), consider client satisfaction as an attribute of project success, while Torbica and Stroh (2001) reckon that if end-users are satisfied, the project can be considered successfully completed in the long run. Liu and Walker (1998) states that Users are those who actually work or live in the final products, they are the ones who spend most of time in the constructed facilities. They go on to state that, ensuring the completed projects meet the users' expectation and satisfaction is essential.

2.2.2.4.2 Project Functionality or 'Fitness for Purpose'

Chan (2000), and Chan et al., (2002), considers' functionality' of project as one of the success measures in the post-construction phase when the project is finished and delivered. According to them, project functionality correlates with expectations of project participant and can be best measured by the degree of conformance to all technical specifications. In addition, they further argue that both financial and technical aspects implemented to technical specifications should be considered, achieving the 'fitness for purpose' objective. Kometa et al., (1995) consider safety requirements, flexibility, time, and quality as part of this. A study conducted by Chinyio et al., (1998) reckons project functionality as a building to be operationally efficient with its intended purpose, durable building and keeping existing buildings operational during construction.

2.2.2.4.3 Quality

According to Parfitt and Sanvido (1993), quality in the construction project is defined as the totality of features required by a product or services to satisfy a given need; fitness for purpose. Quality is the guarantee of the products that convince the customers or the end-users to purchase or use. Songer et al., (1996) and Wateridge (1995) advocates that Specification as one of the criteria, and defined it as the workmanship guidelines provided to contractors by clients or client's representative at the commencement of project execution. The measure of technical specification is to what extent the technical requirements specified can be achieved. Actually, technical specification is provided to ensure that buildings are built to good standard and by proper procedure. According to Freeman and Beale (1992), meeting technical specification is meeting 'quality'.

2.2.2.4.4 Free from Defects

Prahl (2002) defines construction defects as work performed that falls below the standard promised or expected by the client or purchaser of the work or services. According to Mazier (2001), construction defects is a broad term used for a wide range of conditions at a building such as leaky, improperly installed windows or the presence of so-called toxic mould. Atkinson (1999), divides the cause of building defects lack of skill, lack of care and lack of knowledge of the site operative and difficult to build, low design and missing project information. It is a mixture of technical inadequacies, managerial inadequacies and operative's skills. In order to avoid construction defects, one way is to impose quality control during the construction process.

2.2.2.4.5 Value and profitability

According to Hamilton (2002); Liu and Leung (2002), 'value' is a measure expressed in currency, effort, exchange, or on a comparative scale which reflects the desire to obtain or retain an item, services or ideal. For Hamilton (2002) 'value' is cost reduction and higher quality thresholds, which lead to greater client satisfaction.

For Parfitt and Sanvido (1993), 'Profitability' measures the financial success of the project and a project must be properly managed to be profitable. Norris (1990) describes profit as the increment by which revenues exceed costs; that is, profitability is measured as the total net revenue over total costs. According to Chan et al., (2002),'Profitability' is measured in the post-construction phase when the final account is settled and both the paying and the paid parties can be sure of the financial result, while Maloney (1990), regards profitability as revenues generated by firm exceeding the cost of producing the revenues.

Alarcon and Ashley (1996), defined the measure of value as evaluating the satisfaction of owner's needs in a global sense. It includes the realization for the owner of quantity produced, operational and maintenance costs, and flexibility. It might be considered as 'business benefit' derived from the completed project. Most projects are profit-oriented. The private clients, developers, as well as the public clients do not want to have a negative net profit after the construction. Therefore, value and profit is an important success criterion, especially in the handover stage. The most common measure of financial achievement is net present value (NPV).

2.2.2.4.6 Absence of any Legal Claims and Proceedings

Kumaraswamy (1997), opines that 'Claims' in construction can be based on the contract itself, a breach of contract, a breach of some other common law duty, a quasi-contractual assertion for reasonable (*quantum merit*) compensation, or extra *ex-gratia* settlement request.

According to Savido et al., (1990), the absence of any claims on projects can be considered a major criterion to all parties (client, designer, and contractor) for measuring project success. Whenever a project is completed without using jurisdiction to settle conflict, the construction project can be considered efficient.

2.2.2.4.7 Learning and Exploitation

Vakola and Rezgui (2000), Learning means changes in knowledge structure, on-going improvements and feedback. Fiol and Lyles (1985), defines learning as the process of improving actions through better knowledge and understanding. In construction project development, the lessons learned in executing a project (whether the project is success or failure) could be applied to future projects.

2.2.2.4.8 Positive Reputation

Maintaining a company's positive image and reputation could be an effectiveness measure of project success to contractors and project consultants by creating good results in performance while implementing projects development.

2.2.2.4.9 Time

Time is the duration for completing the project. It is scheduled to enable the building to be used by a date determined by the client's future plans (Hatush and Skitmore (1997). Alarcon and Ashley (1996) considered 'effectiveness' as a success criterion. They defined effectiveness as a measure of how well the project was implemented or the degree to which targets of time and cost from the start-up phase to full production. Therefore, effectiveness will be measured under this category. From Naoum (1994) and Chan (1997), time can be measured in terms of construction time, speed of construction and time overrun. Construction Time is the absolute time that is calculated as the number of days/weeks from start on site to practical completion of the project. Construction time = Practical Completion Date – Project Commencement Date.

2.2.2.4.10 Cost

Bubashait and Almohawis (1994), define' 'Cost' as the degree to which the general conditions promote the completion of a project within the estimated budget Cost is not only confined to the tender sum only, it is the overall cost that a project incurs from inception to completion, so it includes any costs that arise from variations, modification during construction period and the cost created by the legal claims, such as litigation and arbitration. The measure of cost can be in the form of unit cost, percentage of net variation over final cost.

2.2.2.4.11 Safety

Bubshait and Almohawis (1994), defines 'Health and safety' as the degree to which the general conditions promote the completion of a project without major accidents of injuries. Sanvido et al., (1992); Parfitt & Sanvido (1993) and Kometa et al., (1995) opine that the measurement of safety is mainly focused on the construction period as most accidents happen during this stage. According to Construction Industry Review Committee, 2001, calculating the annual accident rate on construction sites forms the base for calculating the accident rate in a specific project.

$$\text{Accident rate} = \frac{\text{Total no. of construction site accidents}}{\text{Total no. of workers employed on a specific project}} \times 1000$$

2.2.2.4.12 Environmental performance

According to Shen et al., (2000), Construction projects affect the environment in numerous ways across their life cycle. Songer and Molenaar (1997), estimate that 14 million tonnages of waste have been put into landfill in Australia each year, 44 % of the waste is attributed to the construction/demolition industry and according to UNIDO (19850,62-86% domestic productions of non-metallic minerals, such as glass, cement, clay, and lime and so on in developing regions are from the construction industry.

Environmental Impact Assessment (EIA) Ordinance is now a widely accepted statutory framework for prediction and assessment of potentially adverse environmental impacts from development projects, Environmental Protection Department (2000). The enforcement of EIA Ordinance provides a good measure for environmental aspects. Therefore the EIA score can be used as an indicator to reflect the environmental performance of a given project.

2.2.3 CONCEPTUAL MODEL

Figure 4, the conceptual model, summarizes what the study found as the main indicators the different stakeholders viewed as important for project success. The conceptual model adopts the approach suggested by Takim, (2003) which focuses on the project as viewed by different stakeholders.

2.2.4 SUMMARY

In summary, success can be defined as the achievement of good results in a project i.e. achieving set goals and objectives that will have positive impact in all stakeholders and other people's lives over a long time.

Traditionally, the success parameters for construction projects have been, cost, time and quality. However, the study identified other indicators for both the construction process and the construction product/result. For the stages the following were identified; for process:Absence of any legal claims, Minimum disputes, Delivering the project within the budget, Meeting social obligations, Minimum scope changes, Comprehensive briefing process by the client, Minimum effect to the environment, Integration of design and construction, Meeting safety requirements, Efficiency in utilization of manpower, Efficiency of approval authorities, Meeting quality specifications and Fast communication and decision-making process.

For the product or result the following were identified namely:Client satisfaction, User satisfaction with product, Project functionality and Fitness for purpose, Absence of defects, Giving value for money and profitability, Developing new knowledge & expertise, Positive reputation of the final product, Increased levels of professionalism, Usable life expectancy, Lower maintenance cost, Aesthetic value, Pleasant environment, Accomplishment core business needs, Meets stakeholders' objectives & an expectation of all stakeholders, Flexible for future expansion and Allowance for adequate training on effective use of the project at the end.Different indicators are important to different stakeholders and play vital roles in project success.

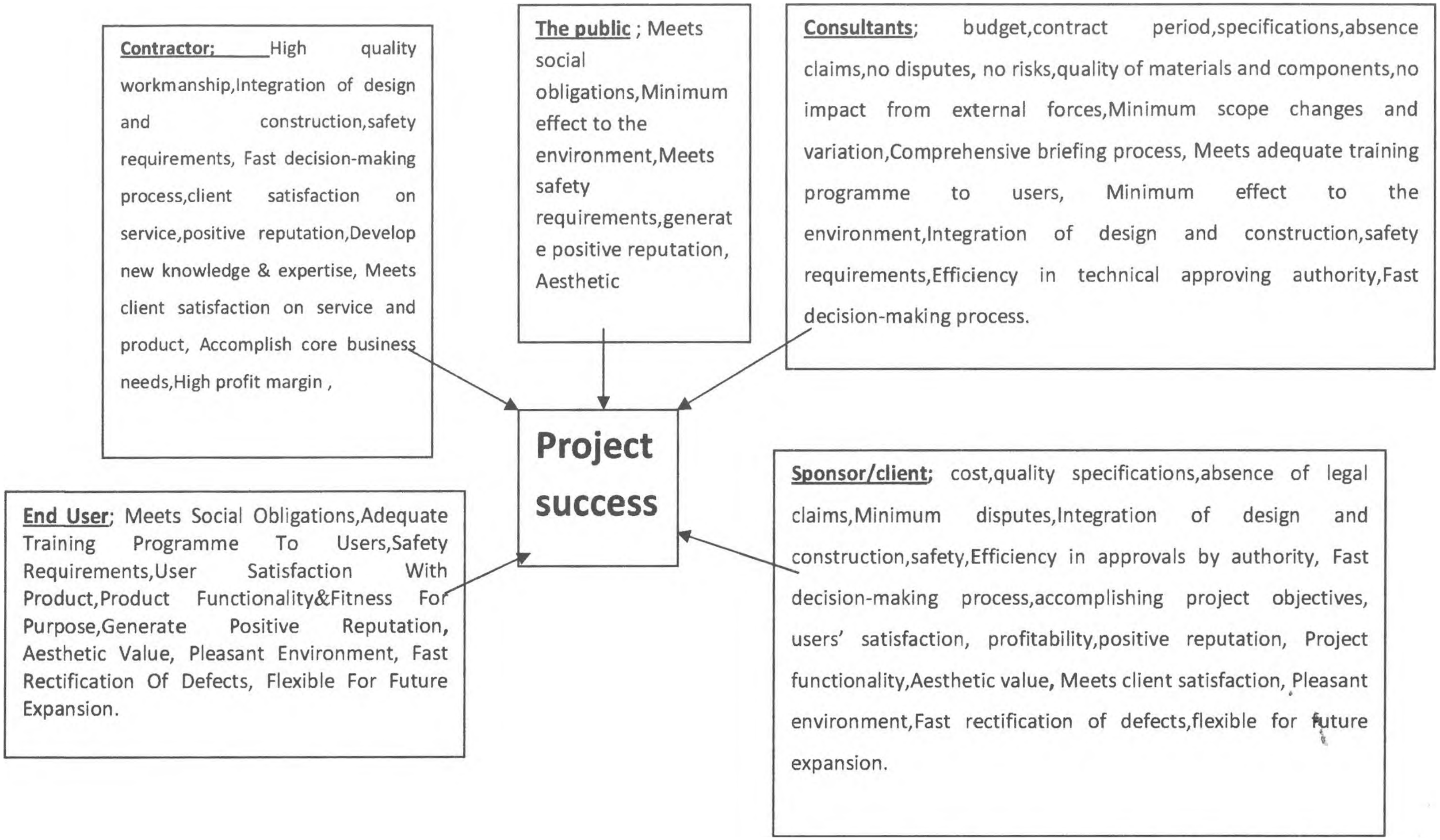

Figure 4: Conceptual/ theoretical framework (consolidated framework) for measuring project, success adopted from Takim, 2003;

The indicators in the various boxes are the ones the stakeholders in the boxes feel very strongly about

CHAPTER THREE: METHODOLOGY

3.0 Introduction

The focus of this research was to evaluate comprehensive and inclusive success indicators that can be utilized in the construction industry. Both quantitative and qualitative performance indicators were explored. A literature search generated the initial set of perceived success indicators.

The research design used was a survey which was largelyqualitative. Survey method involves the collection of information from a sample of individuals through their responses to questions. It is an efficient method for systematically collecting data from a broad spectrum of individuals and educational settings. Indeed, many researchers choose this method of data collection due to its versatility, efficiency, and generalizability. Moreover, survey data can be collected from many people at relatively low cost and, depending on the survey design, relatively quickly. Therefore, questionnaires were used to collect information concerning perceptions of the construction industry stakeholders on the indicators of interest.

The study was limited to Nairobi due to the time and financial constraints.Also from the addresses supplied by Board of Registration of Architects and Quantity Surveyors (BORAQS), Engineers Registration Board (ERB) and National Construction Authority (NCA) for registered contractors, majority of the construction industry stakeholders were located in Nairobi.

3.1 Population

The target population consisted of building construction stakeholders within Nairobi. Architects with ten or more years' experience helped identify other stakeholders in the projects they had handled.

3.2 Sampling

A multistage sampling strategy was used to identify the individual respondents included in the study. The first stage involved the identification of architects to be included in the study. An initial number of ten architects were used for the pilot exercise. Ten was found to be a bit small for the study after the pilot exercise. A total of 60 architects were then sampled using systematic random sampling method. Using the list of registered architects at the board of registration of architects and quantity surveyors, Architects with ten or more years post registration experience were identified first (a pilot exercise had shown that architects with ten years' experience and not less had a good grasp of the issues in the construction industry). Since it was sixty architects who were required to help in identifying other stakeholders, the number of registered architects with ten or more years' experience which was 451 was divided by sixty to get the7th architect. In the study every 7th listed architect with ten or more years post registration experience was chosen. This produced a systematic random sample size the researcher had no control over which architect was to be chosen. Therefore each architect had an equal and independent chance of being selected into the sample. These architects then helped in selecting the other stakeholders.

In the second stage, the other stakeholders were identified using a snowball sampling method with the earlier sampled architects acting as the source of information. By using the architect to identify the other members of the sample, the study identified the actual stakeholders associated with actual projects, since the architects chose This process led to the identification of a total of 490 stakeholders consisting of quantity surveyors, civil/structural engineers, mechanical engineers, environmental impact assessment experts, developers, contractors, end-users and public/neighbours to the construction work. Table 2 details the numbers per category.

Table 2: Category of stakeholders sampled

Item	Respondent type	Questionnaires sent out
1	Architects	60
2	Quantity surveyors	43
3	Civil structural/ engineers	26
4	Electrical engineers	28
5	Mechanical engineers	27
6	Environmental impact assessment experts	37
7	Developers	60
8	Contractors	29
9	End users	93
10	The public/neighbours to the buildings	87
Total		490

3.2.1 Data source and data collection methods

Data collection was done using self-administered questionnaire with both structured and semi-structured questions. The method was chosen because the target population is a literate group who are able to read and write. The questionnaire consisted of a list of selected indicators for both process and results of construction project from Figure 5. The rating of the indicators was measured on a 5 point Likert scale. The scale was structured with 1 representing not important; 2 important; 3 fairly important; 4 very important and 5 extremely important. A total of 13 indicators were selected for process and 16 indicators for results. The questions were all structured in a positive format to allow for consistency given the large number of indicators in the study.

A pilot study was carried out to test the study instruments using 10% of the total sample size. No other method of data collection was used save for secondary literature that aided in the interpretation and selection of the indicators.

3.2.2 Data Analysis and Presentation

Data collected using the questionnaire was entered into computer spreadsheet in a standard format to allow for the computation of both descriptive and inferential statistics. The descriptive statistics generated included frequencies, means, and standard deviations. These descriptive statistics provide the patterns of ratings and variations among the various stakeholders for both process and results. The inferential statistics was used to test the significance of the relationship and nature and direction of association between the target variables. The inferential statistics used the one sample t-test because of its' ability to compare two variables. This enabled the researcher to compare the sample means with the sub-sample means for the various stakeholders sampled in the study. All the test of significance was done at 0.05 probability of error. In order to identify the success Indicators, respondents were asked to rate selected indicators extracted from the conceptual model using a 5 point Likert scale of 1=not important, 2=fairly important, 3=important, 4=very important and 5= extremely important.

3.3 Limitations

This research being academic was limited to a period it could take. Construction projects take long to complete and one could not follow a project from start to completion in order to establish how success is viewed throughout the stages of the project. As such, the study relied on perceived ratings based on past experiences and not on a specific construction project. This explains why the study was keen at including only those stakeholders who had 10 or more years of experience in their respective areas.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.0 Introduction

This chapter details the stakeholders rating of selected indicators for construction project process and results by various stakeholders. The range of professional experience of the architects' respondents in terms of number of years in the construction industry was between 10 and 36 years with an overall average of approximately 16.46 years; this provides a good spread of personal experience in the sample. Therefore, it was reasonable to infer that they had reasonable knowledge of the activities associated with construction projects.

The indicators were divided into process and success indicators because they are time dependent. For instance, there are those that determine success at design stage, at implementation stage, at project handing over and others are long term.

Using the 5-point likert scale, 4 and above where very important and extremely important lied, was assumed to represent those stakeholders who felt very strongly in support of the contribution of the stated indicator towards project success. While those with a likert scale average of 3 were those stakeholders who rated the indicators as not important and important and hence, were assumed to have reservations about the relative contribution of the indicator towards project success. Those who rated the indicator as fairly important were considered as being neutral or uncertain about the contribution of the indicator. Therefore, the study lumped together the categories of extremely important and very important and used them as the highly ranked indicators.

4.1 Response rate by various stakeholders

Table 3: Questionnaire response rate by various stakeholders

Item	Respondent type	Questionnaires sent out	Questionnaires returned	% Total Respondents
1	Architects	60	19	48.3
2	Quantity surveyors	43	17	39.5
3	Civil structural/ engineers	26	12	46.2
4	Electrical engineers	28	8	28.6
5	Mechanical engineers	27	16	59
6	Environmental impact assessment experts	37	18	48.6
7	Developers	60	14	23.3
8	Contractors	29	8	27.6
9	End users	93	23	24.7
10	The public/neighbours to the buildings	87	23	26.4
	Total	490	158	32.2

Table 4: % Representation of returned questionnaires by the various stakeholders

Item	Respondent type	Questionnaires Returned	% returned
1	Architects	19	12.0
2	Quantity surveyors	17	10.8
3	Civil structural/ engineers	12	7.6
4	Electrical engineers	8	5.1
5	Mechanical engineers	16	10.1
6	Environmental impact assessment experts	18	11.4
7	Developers	14	8.9
8	Contractors	8	5.1
9	End users	23	14.6
10	The public/neighbours to the buildings	23	14.4
	Total	158	100

As indicated on Table 4, out of 490 questionnaires that were distributed to various stakeholders only 158 responded which was an equivalent of 32.2%. Although this response rate may seem to be low, however this is not uncommon and is acceptable. Indeed, Akintoye (2000) and Dulami and colleagues (2003) reported that, the usual response rate in the construction industry for questionnaires is between 20-40 percent and therefore, our response rate of 32.2 % is normal. Infact, Ofori and Lean (2001) received a 26 percent response rate, Vidogah and Ndekugri (1998) received a 37 percent response rate and Shash (1993) received a 25.3 percent rate, just to mention a few. Nevertheless, the questionnaires were completed by the various project stakeholders and, thus, give us confidence that the responses were reliable.

4.2.0 Stakeholder rating of success indicators for process of construction projects

The construction process is an important part in the construction cycle. A total of 13 project process indicators were identified from literature namely: absence of legal claims, minimum effects to the environment, meeting social obligations, efficiency in utilization of manpower, fast communication and decision making process, integration of design and construction, delivery within the budget, minimum disputes, minimum changes, efficiency of approving authorities, comprehensive briefing by the client, meeting safety requirement and meeting quality specifications.

The rating of these indicators by the various stakeholders is presented on Table 4. Different stakeholders seemed to have rated various indicators depending on their interests in the project which was expected(Atkinson, 1999).Indeed, a successful project must bargain between the benefits of the organization and the satisfaction of end users and other stakeholders.This notwithstanding, all the studied indicators were generally highly rated (above 2.5 likert scale i.e. very important and extremely important) by all stakeholders ranging from 52% to about 88%. This was expected considering that the greatest wish of any stakeholder in a project is to have the project completed successfully and be put to its intended use (Kometa et al.,1995).

Notably, for a developer the success of a project is tied to the returns on investment, Herbsman & Ellis (1992); for the consultants and contractors it will mean a satisfied client, good reputation and more business, Rosenbaum, Rubin, and Powers (2002); for the project end-users it will mean functional spaces and a friendly environment; and for the community around the projects neighbourhoods it means an environment to be proud of and associated with, which is consistent with the opinions of Haponava , Al-Jibouri and Reymen (2009).

According to Herbsman and Ellis (1992), OFPP (1998), Rosenbaum, Rubin, and Powers (2002), Post (1998), CIB (2000), Egan (1998), Haponava, Al-Jibouri and I. Reymen (2009), there have been various efforts and attempts in many countries in the construction industry to set up measures to improve the performance in the construction activities including continuous improvement, partnering, lean construction, and implementing different delivery systems. The aim has been to improve overall project performance or to measure the performance of its main activities. The results of such attempts have produced a number of measures and indicators for example KPI in the UK, KPI, (2000) which was adopted in the study conceptual model, and the construction performance measures developed by the CII in the United States (CII,2000).

The UK working groups on Key Performance Indicators (KPIs) identified ten parameters for benchmarking projects in order to achieve a good performance (Egan, 1998). In the United States of America, the construction industry institute has come up with performance indicators too (CII, 2000).

4.2.1 Individual Stakeholder rating of indicators for construction process

The individual stakeholder rating of various process indicators are presented in Table 5. From these results, architects, quantity surveyors, electrical engineers and developers rated all indicators generally highly (above 50%). On the other hand, environmental impact assessment experts and members of the public rated most of the indicators highly apart from; minimum scope changes and meeting social obligations for environmental impact assessment experts and members of the public, respectively. Mechanical engineers, rated more than half of the indicators lowly (below 50%), while the civil/structural engineers' rated 3 out of the thirteen indicators lowly. Just as Atkinson, (1999), Pin to and Slevin, (1988; 1989) and Cooke Davies, (2002), and many others noted, different stakeholders value different indicators depending on their interests in the project and hence these differences are reflected on their rating of various indicators.The findings of this study showed that developers, Quantity Suryors, EIA experts and Architects were more conscious about legal claims and hence scored this indicator highest at 84.2%76%, 75.8, and 75% respectively, while Civil/Structural Engineers, Electrical Engineers, the public and mechanical Engineers showed less consciousness on the indicator and therefore, scored it at 50% and below. Legal claims on construction projects lead to a delay in project completion and loss. From the results, there was a general concurrence that absence of legal claims is a key to the success of the construction projects. Indeed, analysis of the variations by different categories of the stakeholders showed that similar trends were maintained with slight variations. The results clearly show that among the stakeholders' ratings of absence of legal claims, the mechanical engineers were the only ones who seemed to have a dissenting voice and appear to down play the importance of this indicator.

Table 5: General stakeholder rating of indicators for the construction project process

Indicator	Not Important =1		Important =2		Fairly Important =3		Very Important =4		Extremely Important =5		% Very important & Extremely important	Total	
	F	%	F	%	F	%	F	%	F	%	**Sum	*F	%
Absence of Legal Claims	4	2.6	24	15.5	21	13.5	96	61.9	10	6.5	68.4	155	100.0
Minimum effects to the environment	8	5.3	13	8.7	12	8.0	73	48.7	44	29.3	78	150	100.0
Meeting social Obligation	6	3.8	23	14.5	30	18.9	76	47.8	24	15.1	62.9	159	100.0
Efficiency in utilization of manpower	3	1.9	26	16.3	10	6.3	74	46.3	47	29.4	75.7	160	100.0
Fast communication and decision-making process	3	1.9	15	9.7	10	6.5	62	40.0	65	41.9	81.9	155	100.0
Integration of design & construction	2	1.3	23	14.7	16	10.3	55	35.3	60	38.5	73.8	156	100.0
Delivery Within the budget	2	1.3	15	9.6	2	1.3	54	34.4	84	53.5	87.9	157	100.0
Minimum Disputes	11	7.2	39	25.7	13	8.6	51	33.6	38	25.0	58.6	152	100.0
Minimum scope Changes	15	9.7	33	21.4	26	16.9	46	29.9	34	22.1	52	154	100.0
Efficiency of approval authorities	9	5.8	13	8.4	14	9.0	46	29.7	73	47.1	76.8	155	100.0
Comprehensive briefing by the client	0	0.0	14	8.9	4	2.5	40	25.3	100	63.3	88.6	158	100.0
Meeting safety Requirements	2	1.3	17	10.8	3	1.9	37	23.6	98	62.4	86	157	100.0
Meeting quality Specifications	8	5.0	13	8.1	6	3.8	35	21.9	98	61.3	83.2	160	100.0

*F =frequency, **Sum= sum of % of very important and %of extremely important

Indeed, absence of legal claims is one of the key to project success. In fact, Savido et al., (1990) agrees that construction claims are often costly in construction and hence, the absence of any claims on projects can be considered a major criterion to all parties (client, designer, and contractor) for measuring project success. Savido and colleagues (Savido et al., 1990) further state that, whenever a project is completed without using jurisdiction to settle conflict, the construction project can be considered efficient.

From the results on Table 5, it was observed that the rating of minimum disputes ranged between 69.7 and 52% with an exception of the Civil/structural engineers. There was a generally high rating of delivery of the project within the budget by all the stakeholders. The highest was 97% while the lowest was 50%. This was in agreement with Atkinson, et al., (1997) who stated that a project is successful if it is achieved on budget. Atkinson and colleagues (Atkinson, et al., 1997) further state that 'Cost' is the degree to which the general conditions promote the completion of a project within the estimated budget. Cost is not only confined to the tender sum only, it is the overall cost that a project incurs from inception to completion, so it includes any costs that arise from variations, modification during construction period and the cost created by the legal claims, such as litigation and arbitration.

Table 6: Stakeholder rating of various indicators for construction process

The Key for the indicators for construction process

	Indicators													
	1	2	3	4	5	6	7	8	9	10	11	12	13	Rating averages
Stakeholders														
Architects	75	54.2	89.3	71	51.6	86.2	69.6	82.1	75	81.3	71.9	78.2	82.1	74.88
Quantity Surveyors	74	61.5	96.1	46.2	65.4	100	73	92.3	96.2	96.2	76.2	80.7	92.3	80.77
Electrical Engineers	50	62.5	75	75	62.5	50	75	75	100	87.5	100	87.5	75	75
Civil/Structural Engineers	50	35.7	78.6	14.3	21.4	92.9	50	53.9	78.6	78.6	57.2	71.4	78.6	58.55
Mechanical Engineers	37.5	55.5	66.6	66.7	42.9	66.8	25	44.4	33.3	66.6	22.2	100	33.3	50.8
Environmental Impact Assessors	75.5	69.7	97	75.1	36.6	96.9	100	54.6	100	46.9	84.4	84.4	87.1	77.55
Developers	79.2	65.2	87.5	70.8	65.2	87.5	91.7	87.5	87.5	83.3	87.5	83.3	87.1	81.8
Members of the public/Neighbours to the projects	50	50	50	25	50	100	75	75	75	50	100	100	100	69.2

1. Absence of legal claims
2. Minimum disputes
3. Delivery of project within budget
4. Meeting social obligations
5. Minimum scope changes
6. Comprehensive briefing process by the client
7. Minimum effect on the environment
8. Integration of design and construction
9. Meeting safety requirements
10. Efficiency in utilization of manpower
11. Efficiency of approving authorities
12. Meeting quality specifications
13. Fast communication and decision making

From Table 6, most stakeholders (6 out of 9) rated meeting social obligations highly (above 50%). Quantity surveyors, members of the public and the Civil/Structural Engineers rated this indicator lowly at 46.2, 25% and 14.3% respectively. This low rating may be as a result of the complexity involved in meeting this indicator. Indeed, Maccarine (2000) observes that to meet social obligations, one requires strategic thinking and technical excellence to help in realizing operational and financial benefits associated with social responsibility and sustainable development. Therefore, opportunities should be identified to improve financial performance and results across the entire life of the project, if possible throughout the entire project life cycle from initiation, design, approvals, construction, operation, closure, social expectations, and long term value (Maccarine, 2000). For example, identification of sustainable energy management and renewable energy strategies, water/waste minimization, to improvement of environmental, social and governance performance in an integrated manner should be encouraged. In the contrary, most stakeholders consider these requirements as unnecessary.

The indicator 'change in the scope' was not highly rated. The highest rating was by Electrical Engineers at 65.4% and the lowest was the Civil/Structural Engineers who rated it at 21.4%. Only four stakeholders rated it at more than 50%. Inasmuch as 'change in the scope' may affect the project's schedule, cost, and quality. Most stakeholders in the study seem to disagree with Englund (2003) who thought that this indicator was important in project success. In fact, Englund (2003) observes that, if a contractor on a construction project requests a change in the design, the project manager must evaluate the impact on the project's schedule, cost, and quality.

Comprehensive briefing was rated highly by most stakeholders. In fact, quantity surveyors and members of the public rated this indicator at 100%, environmental impact assessors, while Civil/Structural Engineers and developers, rated it at more than 90%. The Architects, mechanical Engineers and Electrical Engineers rated it at 86.2%, 66.8% and 50% respectively. This rating seems to agree with other researchers who feel that good briefing is a key process to the success of a project (Norzan and Ahmed et al., 2009). Indeed, in client briefing, the client's needs for the proposed building are expressed, defining the project objectives and its formulation. This provides certainty and dictates other stages of project implementation an essential component in successful outcomes (Norzan and Ahmed et al., 2009). Moreover, Nyhan and Martin (2009) further agree that a clients' active participation is one of the most important factors in ensuring project success. However, the quality of the service received depends partly on the client's involvement and a positive attribute to promote continuous improvement, particularly in the briefing process.

Minimum effect on the environment was mostly rated highly by the stakeholders with environmental impact assessment experts rating it at 100%. The other stakeholders also rated it highly at between 91.3% and 50% except the mechanical Engineers who rated it lowly at 25%. This was consistent with Shen et al., (2000) who noted that Environmental Impact Assessment (EIA) Ordinance is now a widely accepted statutory framework for prediction and assessment of potentially adverse environmental impacts from development projects. Indeed, the enforcement of EIA Ordinance provides a good measure for environmental aspects. It has also been observed that lately, all big construction and building projects in Kenya must have their likely environmental impact evaluated. Actually, implementation is allowed only when acceptable steps have been taken to mitigate any negative impact they have been seen to cause. Songer and Molenar (1997) agree that, since construction projects affect the environment in numerous ways across their life cycle, the EIA score can be used as an indicator to reflect the environmental performance of a given project.

Integration of design and construction was generally rated highly by all the stakeholders except the mechanical Engineers who rated it at 44.4%. In most cases, planning, design, construction, operation and maintenance are separated by disciplines and executed in phases, in an adversary environment and with little interaction between phases and disciplines. Kumaraswamy (1997) while agreeing that integration should be encouraged cautions that the fragmentation of the design/construction industry reduces quality and increases the life cycle costs of the final product. Therefore, there should be incorporation of construction knowledge into the *design process in order to improve constructability.*

Except the mechanical Engineers who rated it at 33.3%, all the other stakeholders rated 'safety' above 75%, with two rating it at 100%. This showed that it's an indicator that is highly rated. Indeed, Savido et al., (1990) agrees that the rate of accidents on a construction site for a specific project can affect performance, which could lead to failure of the project.

From our results, manpower utilization was rated highly by most stakeholders, with the highest rating it at 96.2% and the lowest at 46.9%. Shen et al., (2000) agrees points out that manpower utilization relates to the strategies, tools and methodologies that an organization relies on to determine its total workload at a given moment. Manpower is therefore important and helps companies assign work based on competence and seniority, determine who reports to whom and ensure efficiency in the way personnel perform tasks and make decisions. The practice helps senior leadership establish occupational rules to combat sluggishness and misunderstanding-two operating ills that often reduce productivity and profitability. Human resources managers work in tandem with business-unit managers to analyze tasks, calculate the number of man-hours needed and set reasonable deadlines to complete duties (Shen et al., 2000).

Efficiency of approving authorities was rated highly at between 57.2% and 100% by most stakeholders except the mechanical engineers who rated it lowest at 22.2%. This rating is consistent with what Snvido et al., (1992) who observed that sometimes planning decisions take too long which slows down or prevents developers from building new developments, and bringing disused or neglected land and buildings back into productive use. However, planning rules or poorly managed planning processes should not unnecessarily prevent or delay development. On the contrary, planning approval processes should be simplified to make policies and guidance simpler and easier to follow (Snvido et al., 1992).

Meeting quality specifications was very highly rated with two stakeholders rating it at 100% and all the others rating it at between 87.5% and 71.4%. The fact that quality in construction projects is the totality of features required to satisfy a given need and fitness for purpose is not in doubt. Indeed, Maccarine (2000) states that quality is the specification and workmanship guidelines provided to contractors by clients or client's representative at the commencement of project execution and must be achieved. Moreover, technical specification is provided to ensure that buildings are built to good standard and by proper procedure. Therefore, meeting technical specification is meeting 'quality' which requires both conformance to the specifications and fitness for use (Maccarine, 2000).

Fast communication and decision making was rated highly between 72% and 100% among the stakeholders except the mechanical Engineers who rated this indicator lowly at 33.3%. Cookie Davies, (2000) defines a 'decision' as being a commitment to a course of action that is intended to yield results that are satisfying for specified individuals. Indeed, 'Fast communication and decision making' must take into consideration limited resources (time, effort, money etc), cultural expectations for consistency with previous decisions, the organization's purpose and intent, and the creative desire to move beyond the current situation. Actually, a decision clears uncertainty and ambiguity.

4.2.2 Differences among stakeholders' rating of process indicators of construction projects.

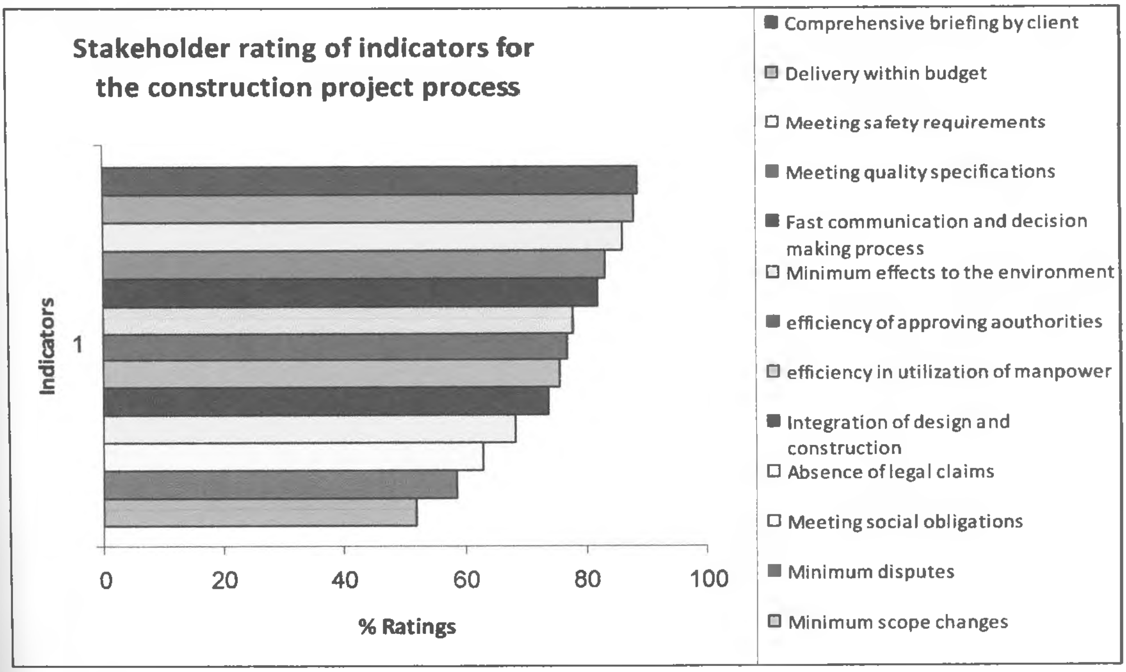

Figure 5: Differences among stakeholders' rating of success indicators of construction projects

From Figure 5, comprehensive briefing by the client was highest on the hierarchy followed by delivery of project within the budget, meeting safety requirements, meeting quality specifications, fast communication and decision making process, minimum effects to the environment, efficiency of approving authorities, efficiency in utilization of manpower, integration of design and construction, absence of legal claims, meeting social obligations, minimum disputes and minimum scope changes in that order. This order was more or less expected considering that for example lack of comprehensive briefing by client could easily deliver the wrong project at the end of the construction process with detrimental effects which is in collaboration with what Englund (2003),states that a project can be completed on time and within the estimated cost but without satisfying the customers' needs.

4.2.3 Different individual stakeholder rating of process indicators

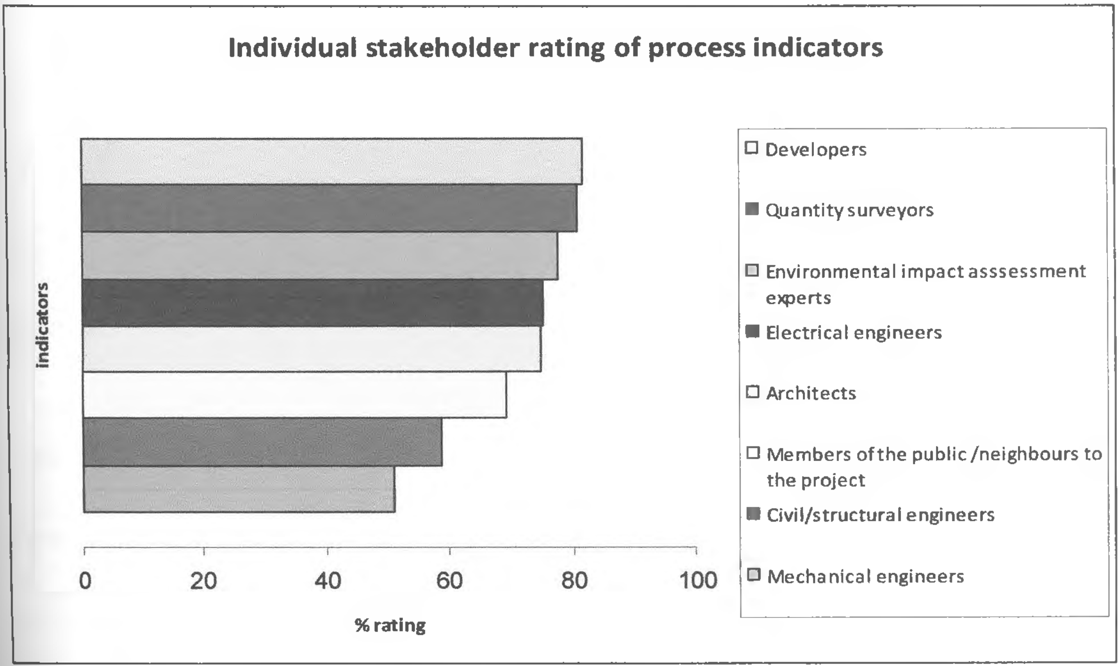

Figure 6: Different individual stakeholder rating of process indicators

As indicated on Figure 6, when various stakeholders rated the process indicators, the developer rating was the highest followed by quantity surveyors, environmental impact assessment experts, electrical engineers, architects, members of the public/neighbours, civil/structural engineers and mechanical engineers in that order. The rating by the developers and quantity surveyors was not surprising. However, the rating by the architects was unexpected and this could not be explained considering that they are the project team leaders and are involved in the project cycle beginning with initiation and hence are expected to understand all the aspects of the project cycle.

Generally this rating was consistent with the findings of a study By Dancan (2004) that noted that project success requires a combination of product success (service, result, or outcome) and project management success, and is supported by Englund (2003) who states that one could miss on all constraints but still have a successful project when viewed over time, as witnessed in the Sydney Opera House in Australia.

4.2.4 Comparision of mean for process by stakeholders

Table 7: Comparison of mean score for process by stakeholders

Stakeholder	N	Mean	Std. Dev.	T	Df	p	Mean Dev.
Developer	22	53.6364	10.80	1.014	21	0.3222	2.33636
Quantity Surveyor	20	53.80	8.23	1.358	19	0.190	2.500
Environmental Impact Assessors	27	51.04	5.50	-0.248	26	0.806	-0.2630
Electrical Engineer	8	50.63	7.17	-0.266	7	0.798	-0.6750
Architect	22	50.55	5.75	-0.616	21	0.545	-0.7545
Member of the Public/Neighbour	4	49.75	11.00	-0.282	3	0.796	-1.5500
Civil/Structural Engineer	13	47.00	10.66	-1.454	12	0.172	-4.300
Mechanical Engineer	5	45.80	11.63	-1.058	4	0.350	-5.500

* (Test Mean/Sample Population Mean = 51.3)

The overall mean as per the rating of stakeholders for the process was 51.3(Table 7). The highest mean was by the developers followed by that by the quantity surveyors.Developers and quantity surveyors are the only stakeholders whose means were above the overall mean at 53.64 and 53.80,respectively. All the other stakeholders had means that were below the overall mean as follows:-EIA experts 51.04,electrical engineers 50.63,architects 50.55,members of the public 49.75, civil/structural engineers 47.00,and mechanical engineers had the lowest at 45.8.

One-way sample t-test was used to determine whether there were mean differences between stakeholders t at 0.05 probability of error. The results showed that none of the stakeholders had means significantly deviating from the overall mean for process indicators meaning that these indicators were rated equally amongst all the studied stakeholders.

4.2.5 Comparison of mean scores for process between stakeholders

Table 8: Comparision of mean score for process between stakeholders

Category	Mean Difference	P
Developer (Mean= 53.6364)		
Architect	-3.09095	0.020*
Quantity Surveyor	0.16360	0.930
Civil/Structural Engineer	-6.6364	0.044*
Mechanical Engineer	-7.83640	0.206
Electrical Engineer	-3.01140	0.274
Environmental Impact Assessor	-2.59936	0.021*
Member of the Public/ Neighbourhood	-3.88640	0.531
Architect (Mean =)		
Quantity Surveyor		
Civil/Structural Engineer	8.3741	0.51
Mechanical Engineer	7.6923	0.110
Electrical Engineer	-2.1410	0.689
Environmental Impact Assessor	-0.8791	0.785
Member of the Public/ Neighbourhood	0.1923	0.976
Quantity Surveyor (Mean =)		
Civil/Structural Engineer	7.6193	0.102
Mechanical Engineer	6.9375	0.177
Electrical Engineer	-2.8958	0.609
Environmental Impact Assessor	-1.6339	0.659
Member of the Public/ Neighbourhood	-0.5625	0.932
Civil/Structural Engineer		
Mechanical Engineer	-0.6818	0.901
Electrical Engineer	-10.5152	0.082
Environmental Impact Assessor	-9.2533	0.050*
Member of the Public/ Neighbourhood	-8.1818	0.237
Mechanical Engineer		
Electrical Engineer	-9.8333	0.120
Environmental Impact Assessor	-8.5714	0.73
Member of the Public/ Neighbourhood	-7.5000	0.301
Electrical Engineer		
Environmental Impact Assessor	1.2619	0.812
Member of the Public/ Neighbourhood	2.3333	0.760
Environmental Impact Assessor		
Member of the Public/ Neighbourhood	1.0714	0.865

*=$p \leq 0.05$ at 95% confidence level

From the results on Table 8, the mean difference for process success indicators between developers and architects (p=0.020), civil/structural engineers (p=0.044) and EIA experts (p=0.021) were statistically significant ($p \leq 0.05$). While the differences between the developers and remaining stakeholders namely: quantity surveyors (p=0.930), mechanical engineers (p=0.206), electrical engineers (p=0.274) and members of the public (p=0.531) were not statistically significant ($p \geq 0.05$). This could be interpreted to mean that the architects, the civil/structural engineers and the EIA seemed to value the studied process indicators compared to the other stakeholders, perhaps because they are more involved in projects right from the beginning.

However, the mean difference between architects and quantity surveyors and other stakeholders, civil/structural engineers and electrical engineers and between civil/structural engineers and the other stakeholders, between mechanical engineers and the other stakeholders, between electrical engineers and EIA experts and members of the public and between EIA experts and members of the public was not also statistically significant ($p \geq 0.05$). While, the mean difference between civil/structural engineers and EIA experts was statistically significant ($p \leq 0.05$).

4.3 General stakeholder Rating of Selected Indicators for Construction Results.

In construction projects results are the ultimate goal because this is the main reason why people set out to do projects.A successfully completed project is that which has achieved good results. In this study, 16 project result indicators as shown on Table 4.4 had been identified as those that influence project results namely: client satisfaction, user satisfaction with the product, project functionality and fitness for purpose, absence of defects, giving value for money and profitability, developing new knowledge and expertise, positive reputation of the final product, increased levels of professionalism, usable life expectancy, lower maintenance costs, aesthetic value, pleasant environment, accomplishment of core business need, meets stakeholders objectives and expectations, flexible for future expansion and allowance for adequate training on effective use of the project.

From the results on Table 6 most of the indicators were highly ranked (very important and extremely important) with the only indicator at the borderline being the allowance for adequate training on effective use of the project rated at 49.1%.

This rating of the result indicators by the stakeholders was not unexpected because the greatest desire of any stakeholder in a project is to have the project completed successfully and have a positive impact in its setting in both the short and long term. This is

in agreement with Baccarine,(1999), who points out that projects are formed to accomplish objectives and success is measured in terms of how well these objectives have been met.

Kometa et al,(1995) notes that, for a developer the success of a project is tied to the returns on investment; for the consultants and contractors it will mean a satisfied client, good reputation and more business; for the project end-users it will mean functional spaces and a friendly environment. Takim and Akintoye (2003) also argue that for the community around the projects neighbourhoods, it means an environment to be proud of and associated with.

Table7: General stakeholder rating of selected indicators for construction results

Indicator	Not Important		Fairly Important		Important		Very Important		Extremely Important		% Very important & extremely Important
	F	%	F	%	F	%	F	%	F	%	
Client satisfaction	4	2.6	10	6.4	1	0.6	34	21.8	107	68.6	90.4
User satisfaction with product	2	1.3	13	8.3	5	3.2	49	31.4	87	55.8	87.2
Project functionality and fitness for purpose	6	3.8	10	6.3	5	3.1	65	40.9	73	45.9	86.8
Absence of defects	16	10.0	22	13.8	13	8.1	31	19.4	78	48.8	68.2
Giving value for money and profitability	3	1.9	25	15.9	11	7.0	46	29.3	72	45.9	75.2
Developing new knowledge and expertise	11	7.3	35	23.3	14	9.3	53	35.3	37	24.7	60
Positive reputation of the final product	6	3.9	22	14.4	6	3.9	50	32.7	69	45.1	77.8
Increased levels of professionalism	9	5.8	18	11.7	13	8.4	46	29.9	68	44.2	74.1
Usable life expectancy	5	3.1	12	7.5	12	7.5	68	42.5	63	39.4	81.9
Lower maintenance cost	10	6.3	12	7.6	15	9.5	66	41.8	55	34.8	76.6
Aesthetic value	10	6.3	12	7.6	15	9.5	66	41.8	55	34.8	76.6
Pleasant environment	0	0.0	25	16.4	15	9.9	61	40.1	51	33.6	73.7
Accomplishment core business needs'	7	4.8	22	15.0	18	12.2	45	30.6	55	37.4	68
Meets stakeholders' objectives and an expectation of all stakeholders	5	3.3	26	17.0	14	9.2	45	28.0	63	41.2	69.2
Flexible for future expansion	14	9.0	23	14.8	13	8.4	53	34.2	52	33.5	67.7
Allowance for adequate training on effective use of the project at the end	14	14.9	39	24.8	17	10.8	45	28.7	32	20.4	49.1

4.4.1 Individual stakeholder rating of various indicators for project results

The individual stakeholder rating of success indicators are presented in Table 7. From these results, quantity surveyors, electrical engineers, members of the public and developers rated all indicators generally highly (above 50%). The architects rated 15 out of the 16 indicators highly, Environmental Impact Assessors rated 14 out of the 16 indicators highly, civil/structural engineers rated 10 out of 16 indicators highly and the mechanical engineers rated half of the indicators highly.

Table 8: Individual Stakeholder rating of selected indicators for project results

	Indicators for results																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Rating average
Stakeholders																	
Architects	96.5	100	81.3	50	71.8	50	85.8	75	65.6	68.8	59.4	73.1	67.9	67.9	58	34.3	69.1
Quantity surveyors	80.8	76.9	96.2	88.5	61.6	54.2	61.6	76.9	92.3	77	57.7	84.6	86.3	70.9	72.7	53.9	74.5
Electrical Engineers	100	100	100	87.5	100	75	87.5	100	75	87.5	75	62.5	42.9	62.5	50	62.5	75.4
Civil/Structural Engineers	78.5	78.5	92.9	57.1	50	42.9	57.1	50	64.3	57.2	07.1	35.7	61.5	42.9	21.4	21.4	51.2
Mechanical Engineers	66.7	66.6	88.9	33.3	75	44.4	66.7	11.1	100	22.2	22.2	77.8	66.7	44.4	11.1	33.3	51.9
Environmental Impact Assessors	100	93.8	81.3	65.6	87.6	68.9	89.7	62.5	84.3	22.6	12.9	77.4	68.8	84.4	93.8	59.4	72.1
Developers	91.7	87.5	87.5	83.4	87	73.9	83.4	79.1	91.6	54.2	69.6	91.7	66.7	87.5	83.4	52.4	79.4
Members of the public/Neighbours to the projects	100	75	50	75	75	75	75	100	100	0	50	50	75	75	75	75	70.3

The key for the indicators for construction results

1. Client satisfaction
2. User satisfaction with the product

3. Project functionality and fitness for purpose

4. Absence of defects

5. Giving value for money and profitability

6. Developing new knowledge and experience

7. Positive reputation of final product

8. Increased level of professionalism

9. Usable life expectance

10. Lower maintenance cost

11. Aesthetic value

12. Pleasant environment

13. Accomplishment of core business needs

14. Meets stakeholder objectives and expectations

15. Flexible for future expansion

16. Allowance for adequate training on effective use of the project.

Client satisfaction was rated very highly among the stakeholders with three of them rating it at 100%, and 3 others rating it at higher than 80% (Table 8). In fact, the lowest rating was at 66.7%. Chan et al., (2002) agrees that satisfaction describes the level of 'happiness' of people affected by a project. Indeed, a client is satisfied when the project is delivered to quality, reliability, and on-time, gives high service levels and affords minimum cost of ownership. Takim and Akintoye (2003) agree that construction projects are directed towards client's objectives, and therefore a successful construction project should meet the client's objectives. Englund (2003) also adds that sometimes the project can be right on scope, schedule, and resources, and still fail to be successful, without satisfying the customers' needs perhaps because the customers' needs were misinterpreted. One could also miss on all constraints but still have a successful project when viewed over time, as witnessed in the Sydney Opera House in Australia. Norizan Ahmed et al., (2009), too is in agreement that the client is the most important participant in a project. The client therefore determines so much in the success of the project.

User satisfaction with the product was generally rated highly by all stakeholders (Table 8) between 66.6% and 100%. Chan et al., (2002) advocates that users are those who actually work or live in the final products, they are the ones who spend most time in the constructed facilities and goes on to state that the end-users will therefore, not be happy if the end product does not meet their requirements in terms of functionality and quality of service. The views of Hatush and Skitmore (1997) further observe that a successful project must bargain between the benefits of the developing organisation and the satisfaction of end users and other stakeholders. Navarre and Schaan (1990) also agree that if end-users are satisfied, the project can be considered successfully completed in the long run. They go on to state that, ensuring the completed projects meet the users' expectation and satisfaction is essential.

Seven out of nine stakeholders rated 'project functionality' at between 81.3% and 100% (Table 8). There was only one group of stakeholders who rated it below 80% at 50%. Chinyio et al., (1998) found that the functionality' of a project in the post-construction phase, when the project is finished and delivered, correlates with expectations of project participants and can be best measured by the degree of conformance to all technical specifications. Technical specifications should be considered as important in achieving the 'fitness for purpose' objective. Project functionality is if the finally the building is operating efficiently within its intended purpose.

The 'absence of defects' was rated highly amongst all stakeholders apart from one (mechanical engineer) who rated it at 33.3% (Table 8). Hughes,Tippet and Thomas, 2004's state that construction defects which are as a result of work performed below the standard promised or expected by the client or purchaser of the work or services are nuisances that should avoided at all costs. In order to avoid construction defects, one way is to impose quality control during the construction process.

Giving 'value for money and profitability' indicator was rated highly by all stakeholders between 50% and 100% (Table 8). As Hamilton, 2002; Liu and Leung (2002) noted, value is a measure expressed in currency, effort, cost reduction and higher quality thresholds, which lead to greater client satisfaction. They also state that 'profitability' on the other hand measures the financial success of the project. They go on to state that its only when a project is properly managed that it'll be profitable and will be considered successful. For Parfit and Sanvido (1993) profitability' is measured in the post-construction phase when the final account is settled and both the paying and the paid parties can be sure of the financial result and is when each party involved will determine how successful the project is financially. Chan et al., agrees that most projects are profit-oriented and in the private clients, developers, as well as the public clients do not want to have a negative net profit after the construction. Therefore, value and profit is an important success criterion, especially in the handover stage. That is why; the most common measure of financial achievement is 'net present value' (NPV).

'Developing new knowledge and expertise' was rated at 75% by the electrical engineers and members of the public, the second highest were the developers at 73.9% followed by the EIA experts at 68.9%, then the QS at 54.2, the Architects at 50%, the mechanical engineers at 44.4% and the lowest were the Civil/Structural Engineers at 42.9% (Table 8). Englund (2003) advocates that learning is the process of improving actions through better knowledge and understanding and in construction project development, the lessons learned in executing a project (whether the project is a success or a failure) could be applied to future projects.

The indicator, 'positive reputation of final product' was rated between 57.1% and 89.7% (Table 8) by all stakeholders. Atkinson (2003) supports 'maintaining a company's positive image and reputation' as a success measure of project to contractors and project consultants by creating good results in performance while implementing projects development.

'Increased level of professionalism' was rated highly by most stakeholders at between 57.1% and 89.7% (Table 8). Alarcon and Ashley (2004) argue in support of this indicator that increased level of professionalism comes with handling a project well and that it increases chances of professional certification or registration by registration boards for professionals/consultants which is a success to them as professionals. For Project Consultants, professional certification is a necessity. They advocate that becoming certified as a consultant offers important benefits to career development and that it helps raise the value of one's service and an increased interest by large corporations. Certification also helps prospective clients make clear decisions to engage a consultant and also offers international recognition, which would be a great success for the consultants.

'Usable life expectancy' was also rated highly between 65.6% and 100% by all the stakeholders (Table 8). Baccarini (1999) states that buildings have service lives, for example, 50 years for reinforced concrete offices, and 22 years for wooden houses. This is useful to eliminate arbitrariness when calculating depreciation for income tax purposes and when calculating asset values. It is generally understood to indicate the number of years a building can be used for and also helps in understanding that land and the buildings on it should not be handled as a single entity. There is no service life for land but there is service life for buildings. There is a difference between life spansand service lives. Service life is the number of years that a building can be put to use, while life span refers to the actual number of years a building can exist. Baccarini (1999) concludes that the longer service life of a construction product has the more returns it will have for its owner and thus the more it will be considered to be.

'Lower maintenance cost' was rated highly amongst all stakeholders between 57.2% and 88.9% (Table 8). These results were expected since the cost of constantly repairing and maintaining buildings is enormous and it makes sense to build with a view to low maintenance. Sadeh et al., (2000) agrees with this and states that at the most basic level it means one has more money for other things. At a macro level it reduces the impact of the huge building repair industry, which consumes massive amounts of fuel and materials.

'Aesthetic value' was not highly rated by most stakeholders (Table 8). In fact, the rating ranged between 7.1% and 69.6%. This may be attributed to the fact that most stakeholders may not appreciate the aesthetics of a structure. Yet, aesthetics should not be ignored. Kobus et al., (2008) seem to agree with this rating by the stakeholders by stating that the aesthetic elements of a building can seldom justify themselves. Aesthetic effects on the general public are limited to experiencing the building from the outside. However, it was expected that architects who are creators of good aesthetics would rate it highly. This is because according to Takim and Akintoye (2003), architects consider aesthetics or functionality as the main criterion rather than building cost. On the contrary, they also rated aesthetics lowly, which was unexpected.

The rating of 'a pleasant environment' by most stakeholders was generally high except the civil/structural engineers who rated it lowly at 35.7% (Table 8). This shows that most of the stakeholders appreciate the concept of a pleasant environment. This is perhaps because, creating a sustainable built environment, through design, construction and management, enables all people to live well, within environmental limits. Songer and Molenaar (1997) concur with this by stating that, our built environment should inspire us and make us feel proud of our local areas and should provide environments that contribute to our physical and mental health and enhance creativity and productivity and be resilient to cope with local effects of climate change.

'Stakeholder rating of accomplishment of core business needs' was generally rated highly apart from electrical engineers who rated this indicator at 42.9% (Table 8). This was not unusual since all stakeholders in a project agree to put up a structure that accomplishes the developer's core business. Except the electrical engineers who are not usually deeply involved in the project and hence may not value the project much, project stakeholders appreciate that core businesses of an organization are idealized constructs intended to express the organization's "main" or "essential" activities. Vakola and Rezgu (2000) state that, a project that fulfils core business processes of a firm is a success especially if it makes each department of an organisation performs its work coordinate departmental activities.

'Meeting stakeholder objectives and expectations' was rated highly amongst the stakeholders apart from two i.e. mechanical engineers and civil/structural engineers who rated it at 44.4% and 42.9%, respectively (Table 8). This indicator was expected to score highly among the stakeholders since each stakeholder desires to have their interests in the projects fulfilled since they all have direct or indirect interest in the project. Atkinson et al., (1997) agrees that every stakeholder has their own needs and end vision and that each of their expectations will not be the same and may divert along different tangents during the phases of the project. In order to be successful and continue the project to completion, the stakeholders interests must be managed and ensure they are all kept happy. Once this happens then the project can be considered a success.

'Flexibility for future expansion' was rated highly by most stakeholders apart from two, civil/structural and mechanical engineers, who rated it at 21.4% and 11.1%, respectively. This observation was surprising since all stakeholders are expected to highly value the flexibility for future expansion. This is because, construction projects are generally heavy, fixed, and normally irreversible once construction has been completed. As existing heavy, fixed facilities, future space demand and expansion is always a challenge. Sadeh et al., (2000) state that, due to economic-based irreversibility, the expansion of a constructed facility may require that the foundations and columns be enhanced and options for expansion are considered at the very beginning of construction. They go on to state that enhancing the foundation and columns represents an up-front cost, but affords the project flexibility for future expansion. This trade-off can be viewed as a future investment, in that a premium has to be paid first for an option that can be exercised later.

The 'allowance for adequate training on effective use of project' was not rated very highly and ranged between 21.5% and 75% (Table 8). While from the conceptual model this indicator was thought to be important, however, the stakeholder rating was low. Actually, this is a much neglected aspect of projects which eventually leads to poor utilization of the final product. Bititici (1994) and Atkinson (1999) point out that end -users as the final project beneficiaries should be trained on how to best look after buildings once the project is in use and people are using it to get their jobs done. Successful projects should not simply be delivered then left alone. They should continue to be nurtured after delivery to yield the best long-term results. Liu and Walker (1998) advocate that the right user-training and user-support will make users feel valued and will go a long way towards driving user adoption and what is more, users will be able to use the project more effectively and to its full potential, more quickly than they would otherwise. Torbica and Stroh (2001) also reckon that this will really bring home the business benefits normally discussed in the cost/benefit analysis at the start of the project as well as helping the developer maintain a great relationship with the user community.

4.4.2 Differences among stakeholders' rating of result indicators of construction projects.

The study further sought to find out how different stakeholder rated result indicators of construction projects. From the results on Figure 7, client satisfaction was rated highest followed by user satisfaction, project functionality and fitness for purpose, usable life expectancy, positive reputation of final product, aesthetic value, lower maintenance costs, giving value for money and profitability, increased levels of professionalism, pleasant environment, meets stakeholders objectives and expectations, absence of defects, accomplishment of core business values, flexible for future expansion, develop new knowledge and expertise and allowance for adequate training for effective use of the project. While the rating of the first 3, i.e. client satisfaction, user satisfaction, project functionality and fitness for purpose were not surprising, it was surprising that allowance for adequate training for effective use of the project was rated lowest. Yet, one would expect stakeholders to be aware on the usefulness of manuals for effective use of a new product.

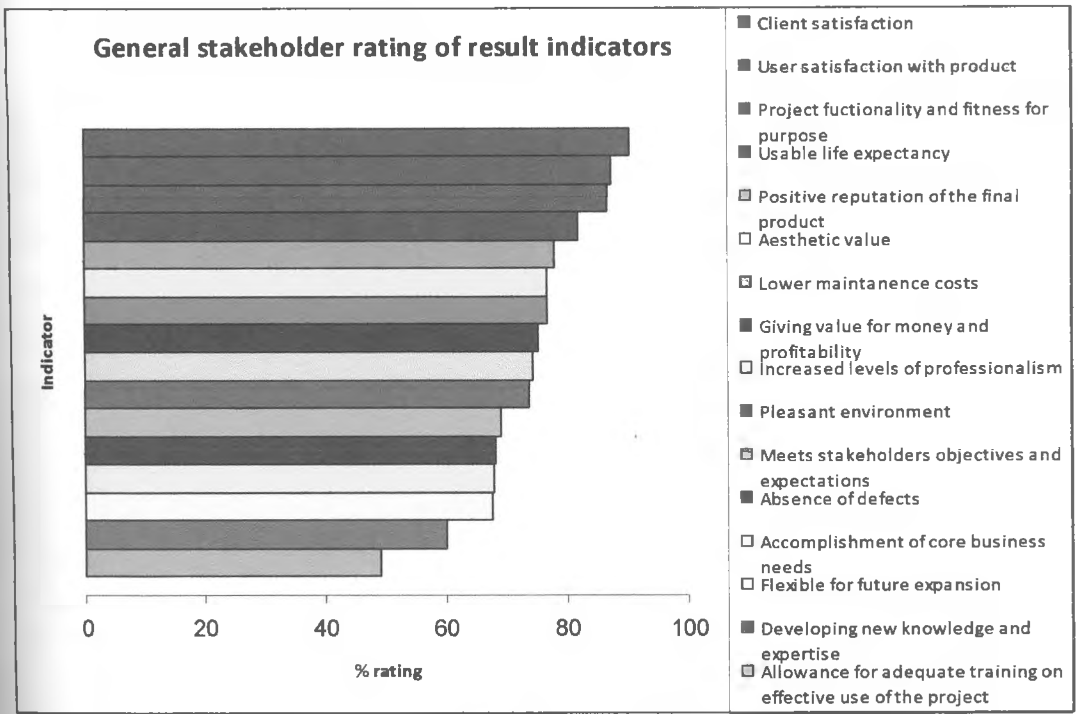

Figure 7: General stakeholder rating of result indicators

4.3.3 Different individual stakeholder rating of result indicators

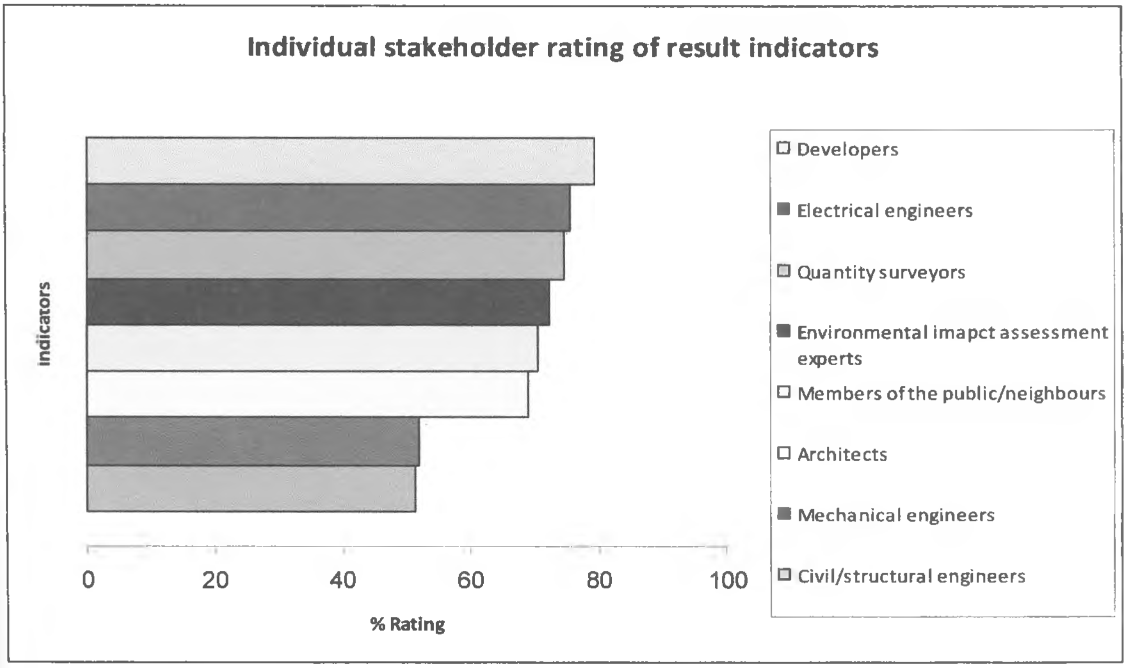

Figure 8: Individual stakeholder rating of result indicators

In the stakeholders' rating of the result indicators, the developers rating was the highest followed by electrical engineers, quantity surveyors, environmental impact assessment experts, members of the public/neighbours, architects, mechanical engineers and civil/structural engineers in that order (Figure 8). The rating by the developers was not surprising. However, the rating by the architects was unexpected and this could not be explained considering that they are the project team leaders and are involved in the project cycle beginning with initiation and hence are expected to understand all the aspects of the project cycle.

4.3.4 Comparison of overall mean for results by stakeholders

Table 9: Comparison of overall mean scores for Results by stakeholder

Stakeholder	N	Mean	Std. Dev.	t	df	p	Mean Dev.
Developer	20	65.40	14.17	1.136	19	0.270	3.600
Electrical Engineer	6	64.33	7.87	0.789	5	0.466	2.533
Environmental Impact Assessors	28	63.07	8.73	0.771	27	0.448	1.2714
Architect	26	62.19	10.02	0.200	25	0.843	0.39
Member of the Public/Neighbour	4	62.00	15.60	0.026	3	0.981	0.200
Quantity Surveyor	16	61.44	16.74	-0.087	15	0.932	-0.36
Mechanical Engineer	8	54.50	6.48	-3.186	7	0.015*	-7.300
Civil/Structural Engineer	11	53.82	11.74	-2.25	10	0.048*	-7.98

Note: Test Mean/Sample Population Mean = 61.8)

*= $p \leq 0.05$

The overall mean per the rating of stakeholders for the results is 61.8 (Table 9).The highest mean is by the developers at 65.4 followed by electrical engineers at 64.33, then EIA experts at 63.07, architects at 62.19, members of the public at 62.0, quantity surveyors at 61.44, mechanical engineers at 54.50. While the lowest mean was that by civil/structural engineers at 53.82.

As it can be seen from Table 9, the developers, electrical engineers, EIA experts, architects and members of the public had means above the overall mean. The other stakeholders i.e. the quantity surveyors, the mechanical engineers and the civil/structural engineers had means lower than overall mean.

One sample test was used to determine whether the means were significant at 0.05 probability of error. The results showed that only two stakeholders (mechanical and civil/structural engineers) had means significantly deviated from the overall means for results. The stakeholders are the mechanical and civil/structural engineers, both of whom had means below the overall mean score for results.It's important to note that none of the stakeholders with means above that of the overall mean score of results were found significantly deviating from the overall mean for the results.

4.3.5 Comparison between mean score for results between stakeholders

Table 10: Comparison between mean score for results between stakeholders

Category	Mean Difference	P
Developer (Mean=65.4)		
Mechanical Engineer	-10.900	0.002*
Civil/Structural Engineer	-11.5818	0.008*
Member of the Public/ Neighbourhood	-3.400	0.692
Architect	-3.20769	0.115
Electrical Engineer	-1.06667	0.753
Environmental Impact Assessor	-2.32857	0.170
Quantity Surveyor	-3.9625	0.359
Architect (Mean = 62.1923)		
Mechanical Engineer	4.7455	0.255
Civil/Structural Engineer	3.5455	0.228
Member of the Public/ Neighbourhood	0.7955	0.861
Electrical Engineer	-0.0796	0.982
Environmental Impact Assessor	-0.4916	0.838
Quantity Surveyor	-3.2546	0.211
Quantity Surveyor (Mean = 61.4373)		
Mechanical Engineer	8.0000	0.058
Civil/Structural Engineer	6.8000	0.024*
Member of the Public/ Neighbourhood	4.0500	0.379
Electrical Engineer	3.175	0.366
Environmental Impact Assessor	2.7630	0.265
Civil/Structural Engineer (Mean = 53.8182)		
Mechanical Engineer	1.2000	0.786
Member of the Public/ Neighbourhood	-2.7500	0.567
Electrical Engineer	-3.6250	0.337
Environmental Impact Assessor	-4.0370	0.156
Mechanical Engineer (Mean = 54.5000)		
Member of the Public/ Neighbourhood	-3.9500	0.483
Electrical Engineer	-4.8250	0.314
Environmental Impact Assessor	-5.2370	0.201
Electrical Engineer (Mean = 64.3333)		
Member of the Public/ Neighbourhood	0.8750	0.865
Environmental Impact Assessor	-0.4120	0.865
Environmental Impact Assessor (Mean = 63.0713)		
Member of the Public/ Neighbourhood	1.2870	0.775

*=$p \leq 0.05$

From Table 10, the difference between means of the developers and mechanical engineers and civil/structural engineers and quantity surveyors and civil/structural engineerswerestatistically significant (p□0.05). While the difference between the mean of architects and other stakeholders were not statistically significant (p□0.05).

Chapter 5: CONCLUSIONS AND RECOMMENDATIONS

5.0 Conclusions

Therefore, as per the stakeholders rating, the construction process indicators in Kenyafrom the most important to the least were:

1.	Comprehensive briefing by the client	88.6%
2.	Delivery of project within the budget	87.9%
3.	Meeting safety requirements	86.0%
4.	Meeting quality specifications	83.2%
5.	Fast communication and decision making process	81.9%
6.	Minimum effects to the environment	78.0%
7.	Efficiency of approving authorities	76.8%
8.	Efficiency in utilization of manpower	75.7%
9.	Integration of design and construction	73.8%
10.	Absence of legal claims	68.4%
11.	Meeting social obligations	62.9%
12.	Minimum disputes and	58.6%
13.	Minimum scope changes in that order	52.0%

When it came to ranking of construction result indicators the stakeholders rated as follows:

1.	Client satisfaction	90.4%
2.	User satisfaction	87.2%
3.	Project functionality and fitness for purpose	86.6%
4.	Usable life expectancy	81.9%
5.	Positive reputation of the final product	77.8%
6.	Aesthetic value	76.6%
7.	Lower maintenance costs	76.6%
8.	Giving value for money and profitability	75.2%
9.	Increased level of professionalism	74.7%
10.	Pleasant environment	73.7%
11.	Meets stakeholders expectations	69.2%
12.	Absence of defects	68.2%
13.	Accomplishment of core business needs	68.0%
14.	Flexible for future expansion	67.7%
15.	Developing new knowledge and expertise	60.0%
16.	Allowance for adequate training on effective use of the project	49.1%

Success indicators vary depending on the country, the type of project, scope, size, complexity, methods used, materials, project teams and so on. Bearing these findings in mind can ensure an undisputed view of how the project will be judged and guarantee a safe path to success.Considering that the time of this study was short, Ffurther study is recommended to test the indicators for refined definition.

5.1 Recommendations

Failures in construction projects are costly and often result in disputes, claims and affect the development of the construction industry. The construction organizations must have a clear mission and vision to formulate, implement and evaluate performance. The construction organizations should always aim to implement projects successfully throughout the project cycle. The following are recommendations related to obtained results:

1. Consideration of comprehensive construction indicators has the potential of having a great and positive impact on construction project delivery. A comprehensive list of success indicators should be developed for the measurement of project success in Kenya.

2. Continuous professional development among the construction industry professionalsshould be done from time to time so as all the stakeholders appreciate other success indicators other than the traditional ones.

4. More research should be carried out to explore other process and result indicators for measuring projects success in Kenya.

5. It is recommended to develop construction projects success measurement framework and modelling system in order to measure success of construction projects. In addition, it is recommended to study and evaluate the most important indicators for project success as a case study of construction projects in Kenya.

REFERENCES

Project Management Institute, (2004). *A Guide to the Project Management Body of Knowledge*. 3rd ed. USA: Project Management Institute.

Akinsola, A.O.; Potts, K.F.; Ndekugri, I.; Harris, F.C., (1997). Identification and evaluation of factors influencing variations on building projects. *Project management*. 15 (4), pp.263-267

Alarcón, L. and Ashley, D. (1996). "Modeling Project Performance for Decision Making." *J. Constr. Eng. Manage.*, 122(3), 265–273.

Albanese, R. (1994). Team-Building Process: Key to Better Project Results. *Journal of Management in Engineering*. 10 (6), pp.36-44.

Atkinson, R, (1999). Project management: Cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International Journal of Project Management*. 17 (6), pp.337-342.

Atkinson, A.A., Waterhouse, J.H., and Wells, R.B. (1997). A stakeholder approach to strategic performance measurement. Sloan Management Review; Cambridge, 38 (3) pp 25-37.

Baguley, P.,(1995). *Managing Successful Projects: A guide for every manager*. London: Pitman Publishing.

Baker, B.N., Murphy, D.C., and Fisher, D., (1983). *Factors affecting Project success. In: D.I. Cleland, (ed.) Project Management handbook*. New York: Van Nostrand Reinhold.

Beale, P. and Freeman M., (1991). Successful Project Execution: A Model. *Project Management Journal*., 22 (4), pp.23-30.

Belassi, W and Tukel, O.I., (1996). A new framework for determining critical success/failure factors in projects . *International Journal of Project management*. 14 (3), pp.141-151.

Belout A., (1998). Effects of Human Resource Management on Project Effectiveness and Success: toward a new conceptual framework. *International Journal of Project Management*., 16 (1), pp. 21-26.

Brown A and Adams J., (2000). Measuring the Effect of Project Management on Construction Outputs: a new approach. *International Journal of Project Management.*, 18 (5), pp. 327-335.

Bubshait, A.A. and Almohawis, S.A., (1994). Evaluating the general conditions of a construction contract. *International Journal of Project Management.*, 12(3), pp.133-135.

Cambridge University, The Cambridge Advanced Learner's Dictionary. (2005). 2nd Edition, UK: Cambridge University Press.

Cammack, J. (2005). *Principles of Project Management* – 1st session, MSc in Project Management, Lancaster University.

Chan, A. P. C. (1996). *Determinants of project success in the construction industry of Hong Kong*. Unpublished PhD Thesis, University of South Australia.

Chan A P C. (1997). Measuring success for a construction project. *The Australian Institute of Quantity Surveyors,* 1(2), pp. 55-59.

Chan A P C., Chan, A.P.L., and Scott, D. (2002). Evaluating project success in the construction industry. *Australian Journal of Construction Management and Economics* (Under review).

Chan A P C., Scott, D., and Lam, E.W.M., (2002). Framework of success criteria For design/build projects. *ASCE Journal of Management in Engineering*, 7 (3), pp.120-128.

Chang A S and Ibbs C W. (1998). Development of Consultant Performance Measures for Design Projects. *Project Management Journal*, 6 (2), pp. 39-54.

Chau K W. (1997). The ranking of construction management journals. *Construction Management and Economics*, 15 (15), pp.387-398.

Cheung S O, Tam C M, Ndekugri I and Harris F C. (2000). Factors Affecting Clients' Project Dispute Resolution Satisfaction in Hong Kong. *Construction Management and Economics*, 18(3), pp. 281-294.

Chua D K H, Kog Y C and Loh P K. (1999). Critical Success Factors for Different Project Objectives. *Journal of Construction Engineering and Management*, 6 (4),pp. 142-150.

Cleland, D. and Ireland, L. (2002). *Project Management: Strategic Design and implementation.* USA: McGraw-Hill.

Cleland, D. and Ireland, L. (2004). *Project Manager's Portable Handbook.* 2nd Edition. USA: McGraw-Hill.

Collin, J. (2002). Measuring the success of building projects – improved project delivery initiatives. *An International Journal.* 11(2), pp.203 – 221.

Construction Industry Review Committee (2002). *Construct for Excellence*. Report of the Construction Industry Review Committee.

Cooke-Davis, T. (2002). The 'real' success factors on projects. *International Journal of Project Management.* 20 (3), pp 185-190.

Cowie, A. P. (Ed). (1990). Oxford Advanced Learner's Dictionary of Current English. 4Th Ed. Oxford University Press.

Dissanayaka, S. M. and Kumaraswamy, M .M. (1999). Evaluation of Factors Affecting Time and Cost Performance in Hong Kong Building Projects. *Engineering, Construction and Architectural Management.* 6 (3), pp. 287-298.

Duncan, R. (2004). Defining and Measuring Project Success, Project Management Partners. http://www.pmpartners.com/resources/defmeas_success.html.

Egan, J. (1998). *Rethinking construction: report of the construction task force on the scope for improving the quality and efficiency of UK construction.* Department of the Environment, Transport and the Region, London.

Environmental Protection Department (2000). *Review of the Operation of Environmental Impact Assessment (EIA) Ordinance and the Continuous Improvement Measures.*Environmental Assessment and Noise Division. Environmental Protection Department.

Evans, J. (2005). *Overdue and over budget, over and over again*. The Economist Jun 9th. http://www.economist.com/node/4065653.

Freeman, M. and Beale. P. (1992). Measuring Project Success. *Project Management Journal*. 23 (1), pp. 8-17.

Gardiner P D and Stewart K. Revisiting the golden triangle of cost, time and quality: the role of NPV in project control, success and failure. International Journal of Project Management, 2000; 18; 251-256.

Gardiner, P. D. and Stewart, K. (2000). Revisiting the golden triangle of cost, time and quality: the role of NPV in project control, success and failure. *International Journal of Project Management*. 18(4), pp.251-256.

Hatush, Z. and Skitmore, M. (1997). Evaluating Contractor Prequalification Data: selection criteria and project success factors. *Construction Management and Economics*. 15 (2), pp. 129-147.

Kagioglou, M., Cooper, R., and Aouad, G. (2001). Performance management in construction: a conceptual framework. *Construction Management and Economics*. 19 (1), pp. 85-95.

Kerzner, H. (2001). *Project Management - A Systems Approach to Planning, Scheduling and Controlling*. 7Th Ed. New York: John Wiley & Sons.

Kerzner, H. (2001). *Strategic planning for project management using a project management maturity model*. New York : Wiley & Sons.

Kometa, S. Olomolaiye, P.O. and Harris, F.C. (1995). An Evaluation of Clients' needs and Responsibilities in the Construction Process. *Engineering, Construction and Architectural Management*. 2(1)pp. 45-56.

Kometa S, Olomolaiye P O and Harris F C. (2000). *An Evaluation of Clients' needs and Responsibilities in the Construction Process*. Engineering, Construction and the KPI Working Group. KPI Report for the Minister for Construction. Department of the Environment, Transport and the Regions.

Kumaraswamy, M. M. and Thorpe, A. (1996). Systematizing construction project evaluations. *Journal of Management in Engineering*. 12 (1), pp, 34-39.

Lim, C.S. and Mohamed, M.Z. (1999). Criteria of project success: an exploratory re-examination. *International Journal of Project Management*. 17 (4), pp. 243-248.

Lim, C.S. and Mohamed, M.Z. (1999). Criteria of Project Success: an exploratory reexamination. *International Journal of Project Management*. 17(4),pp. 243-248.

Liu, A. M. M. and Walker, A. (1998). Evaluation of Project Outcomes. *Construction Management and Economics*. 16 (3), pp. 209-219.

Longo, P.M. (1991). Development of In-house Project Evaluation Checklist. *Journal of Management in Engineering*. 7(2),pp. 153-165.

Maylor, H. (2005). *Project Management*. 3Rd Ed. UK: Prentice Hall.

Mbugua, L.M., Harris, P.T., Holt, G.D., and Olomolaiye, P.O. (1999). A framework Fordetermining critical success factors influencing construction business performance. *In:* Hughes, W (Ed.), *15thAnnual ARCOM Conference*, 15-17 September 1999, Liverpool John Moores University. Association of Researchers in Construction Management. 1, pp. 255-64.

Moodley, K. and Preece, C.N. (1996). Implementing community policies in the construction industry. *The Organization and management of Construction: Shaping theory and practice*. 1, pp. 178-186.

Naoum, S. G. (1994). Critical Analysis of Time and Cost of Management and Traditional Contracts. *Journal of Construction Engineering and Management*. 120 (3), pp. 687-705.

Pinto, M.B. and Pinto, J.K. (1991). Determinants of Cross-functional Cooperation in The Project Implementation Process. *Project Management Journal*. 22 (2), pp. 13-20.

Rad, P.F. and Levin, G. (2002). *The Advanced Project Management Office*. USA: St.Lucie Press.

Right Track Associates. (2003).Defining project success. http://ezinearticles.com/?Analysis-of-Project-Success-Criteria-and-Success-Factors&id=159101.

Sanvido, V., Grobler, F., Pariff, K., Guvents, M., and Coyle, M. (1992). Critical Success Factors for Construction Projects. *Journal of Construction Engineering and Management*. 118 (1), pp. 94-111.

Shenhar, A. J., Levy, O., and Dvir, D. (1997). Mapping the Dimensions of Project Success. *Project Management Journal*. Pp. 5-13.

Thomsett, R. (2002). *Radical Project Management*. USA: Prentice Hall.

Tinnirello, P.C. (2002). *New Directions in Project Management*. USA: Auerbach.

Torp, O., Austeng, K., and Mengesha, W.J. (2004). *Critical Success factors for project performance: A study from from-end assessments of large public projects in Norway.*

Tukel, O.I and Rom, W.O. (1998). Analysis of the Characteristics of Projects in diverse industries. *Journal of Operations Management*. 16 (4), pp.43-61.

Turner, J.R. and Muller, R. (2005). The project manager's leadership style as a success factor on projects. *Project Management Institute*. 36 (1), pp. 49-61.

Walker,D.H.T. (1996). The Contribution of the Construction Management Team to Good Construction Time Performance – an Australian Experience. *Journal of Construction Procurement*. 2(2), pp. 4-18.

Wideman, R. M. (1996). *Improving PM: Linking Success Criteria to Project Type*. paper presented to the Southern Alberta Chapter, Project Management Institute, Calgary Symposium.

Wong, W. S. and Chan, E. H. W. (2000). *Building Hong Kong: Environmental Considerations*. HK: Hong Kong University Press.

Yeong, C. M. (1999). *Time and Cost Performance of Building Contracts in Australia and Malaysia*. MSc Thesis, University of South Australia, Australia.

Appendices

Appendix 1

1. Individual stakeholder rating of individual indicators

Table 11: Stakeholder rating of absence of legal claims

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	4.20	12.50	4.20	66.70	12.50
Architect (N=28)	3.60	17.90	3.60	75.00	0.00
Quantity Survey (N=25)	4.00	4.00	16.00	68.00	8.00
Civil/Structural Engineers (N=14)	0.00	42.9	7.10	50.00	0.00
Mechanical Engineer (N=8)	0.00	0.00	62.5	37.5	0.00
Electrical Engineer (N=8)	12.50	12.50	25.00	50.00	0.00
Environmental Impact Assessor (N=33)	0.00	9.10	15.20	66.70	9.10
Member of the Public/Neighbour (N=4)	0.00	25.00	25.00	25.00	25.00

Table 12: Stakeholder rating for 'minimum disputes'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=23)	4.30	30.40	0.00	43.50	21.70
Architect (N=24)	0.00	25.00	20.80	41.70	12.50
Quantity Survey (N=26)	7.70	15.40	15.40	34.6	26.90
Civil/Structural Engineer (N=14)	28.60	35.70	0.00	14.30	21.40
Mechanical Engineer (N=9)	11.1	33.3	0.00	33.3	22.2
Electrical Engineer (N=8)	0.00	12.50	25.00	25.00	37.50
Environmental Impact Assessor (N=33)	6.10	24.20	0.00	39.40	30.30
Member of the Public/Neighbour (N=4)	25.00	0.00	25.00	25.00	25.00

Table 13: Stakeholder rating of delivering project within budget

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	0.00	8.30	4.20	29.20	58.30
Architect (N=28)	0.00	10.7	0.00	53.60	35.7
Quantity Survey (N=26)	0.00	3.80	0.00	11.50	84.60
Civil/Structural Engineer (N=14)	14.30	7.10	0.00	28.60	50.00
Mechanical Engineer (N=7)	0.00	33.3	0.00	22.20	44.40
Electrical Engineer (N=8)	0.00	25.00	0.00	25.00	50.00
Environmental Impact Assessor (N=33)	0.00	3.00	0.00	48.50	48.50
Member of the Public/Neighbour (N=4)	0.00	25.00	25.00	25.00	25.00

Table 14: Stakeholder rating of meeting social obligations

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	8.30	8.30	12.50	45.80	25.00
Architect (N=31)	0.00	25.80	3.20	51.60	19.40
Quantity Survey (N=26)	0.00	15.40	38.50	30.80	15.40
Civil/Structural Engineer (N=14)	0.00	35.70	50.00	14.30	0.00
Mechanical Engineer (N=9)	11.10	0.00	22.20	55.60	11.10
Electrical Engineer (N=8)	0.00	25.00	0.00	37.50	37.50
Environmental Impact Assessor (N=32)	9.40	0.00	15.60	68.80	6.30
Member of the Public/Neighbour (N=4)	0.00	25.00	50.00	25.00	0.00

Table 15: Stakeholder rating of 'minimum scope changes'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=23)	8.70	26.10	0.00	26.10	39.10
Architect (N=31)	16.10	12.90	19.40	48.40	3.20
Quantity Survey (N=26)	0.00	15.40	19.20	15.40	50.00
Civil/Structural Engineers (N=14)	28.60	21.40	28.60	7.10	14.30
Mechanical Engineer (N=8)	14.30	0.00	42.90	28.60	14.30
Electrical Engineer (N=8)	0.00	12.50	25.00	50.00	12.50
Environmental Impact Assessor (N=30)	0.00	46.70	16.70	23.30	13.30
Member of the Public/Neighbour (N=4)	0.00	25.00	25.00	50.00	0.00

Table 16: Stakeholder rating of 'comprehensive briefing by client'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	0.00	12.50	0.00	12.50	75.00
Architect (N=29)	0.00	3.40	10.30	37.90	48.30
Quantity Survey (N=26)	0.00	0.00	0.00	15.40	84.60
Civil/Structural Engineer (N=14)	0.00	7.10	0.00	14.30	78.60
Mechanical Engineer (N=9)	0.00	33.30	0.00	11.20	55.60
Electrical Engineer (N=8)	0.00	37.50	12.50	25.00	25.00
Environmental Impact Assessor (N=33)	0.00	3.00	0.00	33.30	63.60
Member of the Public/Neighbour (N=4)	0.00	0.00	0.00	75.00	25.00

Table 17: Stakeholder rating of 'minimum effects on environment'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	0.00	8.30	0.00	62.50	29.20
Architect (N=23)	0.00	4.30	26.10	52.20	17.40
Quantity Survey (N=26)	0.00	11.50	15.40	53.80	19.20
Civil/Structural Engineer (N=14)	28.60	21.40	0.00	42.90	7.10
Mechanical Engineer (N=8)	50.00	12.50	12.50	25.00	0.00
Electrical Engineer (N=8)	0.00	25.00	0.00	50.00	25.00
Environmental Impact Assessor (N=33)	0.00	0.00	0.00	45.50	54.50
Member of the Public/Neighbour (N=4)	0.00	25.00	0.00	50.00	25.00

Table 18: Stakeholder rating of 'integration of design and construction'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	0.0	8.30	4.20	20.80	66.70
Architect	0.00	10.70	7.10	57.10	25.00
Quantity Survey (N=26)	3.80	0.00	3.80	38.50	53.80
Civil/Structural Engineer (N=13)	0.00	30.80	15.40	23.10	30.80
Mechanical Engineer (N=9)	0.00	33.30	22.20	33.30	11.10
Electrical Engineer (N=8)	0.00	25.00	0.00	37.50	37.50
Environmental Impact Assessor (N=33)	0.00	24.20	21.20	27.30	27.30
Member of the Public/Neighbour (N=4)	0.00	0.00	25.00	50.00	25.00

Table 19: Stakeholder rating of 'meeting safety requirements'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	0.00	12.50	0.00	8.30	79.20
Architect (N=28)	0.00	17.90	7.10	28.60	46.40
Quantity Survey (N=26)	0.00	3.80	0.00	30.80	65.40
Civil/Structural Engineer (N=14)	14.30	7.10	0.00	0.00	78.60
Mechanical Engineer (N=9)	0.00	66.70	0.00	0.00	33.30
Electrical Engineer (N=8)	0.00	0.00	0.00	62.50	37.50
Environmental Impact Assessor (N=33)	0.00	0.00	0.00	33.30	66.70
Member of the Public/Neighbour (N=4)	0.00	0.00	25.00	50.00	25.00

Table 20: Stakeholder rating of 'efficiency in utilization of manpower'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	0.00	12.50	4.20	20.80	62.50
Architect (N=32)	0.00	15.60	3.10	62.50	18.80
Quantity Survey (N=26)	0.00	3.80	0.00	73.10	23.10
Civil/Structural Engineer (N=14)	14.30	7.10	0.00	42.90	35.70
Mechanical Engineer (N=9)	0.00	11.10	22.20	33.30	33.30
Electrical Engineer (N=8)	0.00	12.50	0.00	50.00	37.50
Environmental Impact Assessor (N=32)	3.10	34.40	15.60	28.10	18.80
Member of the Public/Neighbour (N=4)	0.00	25.00	25.00	25.00	25.00

Table 21: Stakeholder rating of 'efficiency of approving authorities'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=24)	0.00	12.50	0.00	33.30	54.20
Architect (N=32)	21.90	6.30	0.00	31.30	40.60
Quantity Survey (N= 21)	4.80	0.00	19.00	28.60	47.60
Civil/Structural Engineer (N=14)	0.00	28.60	14.30	28.60	28.60
Mechanical Engineer (N=9)	0.00	11.10	66.70	11.10	11.10
Electrical Engineering	0.00	0.00	0.00	37.50	62.50
Environmental Impact Assessor (N=32)	3.10	6.30	6.30	28.10	56.30
Member of the Public/Neighbour (N=4)	0.00	0.00	0.00	50.00	50.00

Table 22: Stakeholder rating of meeting quality specifications

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer(N=23)	0.00	16.70	0.00	8.30	75.00
Architect (N=32)	12.50	0.00	9.40	31.30	46.90
Quantity Survey (N=26)	3.80	15.40	0.00	11.50	69.20
Civil/Structural Engineer (N=14)	14.30	7.10	7.10	7.10	64.30
Mechanical Engineer (N=9)	0.00	0.00	0.00	55.60	44.40
Electrical Engineer (N=8)	0.00	12.50	0.00	50.00	37.50
Environmental Impact Assessor (N=32)	3.10	6.30	6.30	21.90	62.50
Member of the Public/Neighbour (N=4)	0.00	0.00	0.00	25.00	75.00

Table 23: Stakeholder rating of 'fast communication and decision making'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Developer (Sell/Own)(N=19)	0.0	12.50	0.00	25.00	62.50
Architect (N=28)	0.00	3.60	14.30	32.10	50.00
Quantity Survey (N=26)	0.00	0.00	7.70	50.00	42.30
Civil/Structural Engineer (N=14)	0.00	21.40	0.00	28.60	50.00
Mechanical Engineer (N= 9)	33.30	22.20	11.10	33.30	0.00
Electrical Engineer (N=8)	0.00	12.50	12.50	50.00	25.00
Environmental Impact Assessor (N=31)	0.00	12.90	0.00	58.10	29.00
Member of the Public/Neighbour (N=4)	0.00	0.00	0.00	50.00	50.00

Appendix 2

2. Individual Stakeholders Rating of Selected Indicators for Construction Results.

Table 24: Stakeholder rating of 'client satisfaction'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	0.00	8.30	0.00	12.50	79.20
Architect (N=28)	0.00	0.00	3.60	28.60	67.90
Quantity Survey (N=26)	3.80	15.40	0.00	15.40	65.40
Civil/Structural Engineers (N=14)	0.00	21.40	0.00	21.40	57.10
Mechanical Engineer (N=9)	33.30	0.00	0.00	0.00	66.70
Electrical Engineer (N=8)	0.00	0.00	0.00	37.50	62.50
Environmental Impact Assessor (N=32)	0.00	0.00	0.00	34.40	65.60
Member of the Public/Neighbour (N=4)	0.00	0.00	0.00	50.00	50.00

Table 25: Stakeholder rating of 'user satisfaction with product'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	0.00	12.50	0.00	29.20	58.30
Architect (N=28)	0.00	0.00	0.00	42.90	57.10
Quantity Survey (N=26)	3.80	0.00	19.20	7.70	69.20
Civil/Structural Engineers (N=14)	0.00	21.40	0.00	21.40	57.10
Mechanical Engineer (N=9)	0.00	33.30	0.00	33.30	33.30
Electrical Engineer (N=8)	0.00	0.00	0.00	50.00	50.00
Environmental Impact Assessor (N=32)	0.00	6.20	0.00	46.90	46.90
Member of the Public/Neighbour (N=4)	0.00	25.00	0.00	25.00	50.00

Table 26: Stakeholder rating of 'project functionality and fitness for purpose'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	0.00	12.50	0.00	25.00	62.50
Architect (N=32)	12.50	0.00	6.20	34.40	46.90
Quantity Survey (N=26)	3.80	0.00	0.00	30.80	65.40
Civil/Structural Engineers (N=14)	0.00	7.10	0.00	50.00	42.90
Mechanical Engineer (N=9)	11.10	0.00	0.00	55.60	33.30
Electrical Engineer (N=8)	0.00	0.00	0.00	50.00	50.00
Environmental Impact Assessor (N=32)	0.00	9.40	9.40	59.40	21.90
Member of the Public/Neighbour (N=4)	0.00	50.00	0.00	25.00	25.00

Table 27: Stakeholder rating of 'absence of defects'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	8.30	8.30	0.00	16.70	66.70
Architect (N=32)	21.90	15.60	12.50	18.80	31.20
Quantity Survey (N=26)	3.80	3.80	3.80	23.10	65.40
Civil/Structural Engineers (N=14)	21.40	7.10	14.30	35.70	21.40
Mechanical Engineer (N=9)	0.00	55.60	11.10	22.20	11.10
Electrical Engineer (N=8)	0.00	12.50	0.00	37.50	50.00
Environmental Impact Assessor (N=32)	3.10	15.60	15.60	9.40	56.20
Member of the Public/Neighbour (N=4)	25.00	0.00	0.00	25.00	50.00

Table 28: Stakeholder rating of 'giving value for money and profitability'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=23)	0.00	13.00	0.00	8.70	78.30
Architect (N=32)	0.00	18.80	9.40	40.60	31.20
Quantity Survey (N=26)	0.00	19.20	19.20	15.40	46.20
Civil/Structural Engineers (N=14)	14.30	21.40	14.30	28.60	21.40
Mechanical Engineer (N=8)	0.00	12.50	12.50	12.50	62.50
Electrical Engineer (N=7)	0.00	0.00	0.00	57.10	42.90
Environmental Impact Assessor (N=32)	3.10	9.40	0.00	43.80	43.80
Member of the Public/Neighbour (N=4)	0.00	25.00	0.00	25.00	50.00

Table 29: Stakeholder rating of developing new knowledge and expertise

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=23)	0.00	17.40	8.70	21.70	52.20
Architect (N=28)	17.90	14.30	17.90	39.30	10.70
Quantity Survey (N=24)	16.70	25.00	4.20	29.20	25.00
Civil/Structural Engineers (N=14)	0.00	50.00	7.10	42.90	0.00
Mechanical Engineer (N=9)	11.10	22.20	22.20	44.40	0.00
Electrical Engineer (N=8)	0.00	25.00	0.00	50.00	25.00
Environmental Impact Assessor (N=29)	3.40	20.70	6.90	44.80	24.10
Member of the Public/Neighbour (N=4)	0.00	0.00	25.00	50.00	25.00

Table 30: Stakeholder rating of 'positive reputation for final product'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	0.00	16.70	0.00	16.70	66.70
Architect (N=28)	0.00	10.70	3.60	42.90	42.90
Quantity Survey (N=26)	7.70	15.40	15.40	23.10	38.50
Civil/Structural Engineers (N=14)	21.40	21.40	0.00	21.40	35.70
Mechanical Engineer (N=9)	0.00	33.30	0.00	55.60	11.10
Electrical Engineer (N=8)	0.00	12.50	0.00	62.50	25.00
Environmental Impact Assessor (N=29)	3.40	6.90	0.00	34.50	55.20
Member of the Public/Neighbour (N=4)	0.00	0.00	25.00	25.00	50.00

Table 31: Stakeholder rating of increased level of professionalism

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	8.30	12.50	0.00	20.80	58.30
Architect (N=28)	0.00	14.30	10.70	46.40	28.60
Quantity Survey (N=26)	0.00	3.80	19.20	15.40	61.50
Civil/Structural Engineers (N=14)	0.00	33.30	16.70	33.30	16.70
Mechanical Engineer (N=9)	0.00	22.20	11.10	55.60	11.10
Electrical Engineer (N=8)	0.00	0.00	0.00	50.00	50.00
Environmental Impact Assessor (N=32)	21.90	9.40	6.20	21.90	40.60
Member of the Public/Neighbour (N=4)	0.00	0.00	0.00	75.00	25.00

Table 32: Stakeholder rating of 'usable life expectancy'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	0.00	4.20	4.20	33.30	58.30
Architect (N=32)	9.40	6.20	18.80	31.20	34.40
Quantity Survey (N=26)	0.00	7.70	0.00	38.50	53.80
Civil/Structural Engineers (N=14)	0.00	35.70	0.00	35.70	28.60
Mechanical Engineer (N=9)	0.00	0.00	0.00	66.70	33.30
Electrical Engineer (N=8)	0.00	25.00	0.00	50.00	25.00
Environmental Impact Assessor (N=32)	0.00	0.00	15.60	56.20	28.10
Member of the Public/Neighbour (N=4)	0.00	0.00	0.00	75.00	25.00

Table 33: Stakeholder rating of low maintenance

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	8.30	8.30	4.20	25.00	54.20
Architect (N=32)	12.50	12.50	6.20	46.90	21.90
Quantity Survey (N=26)	0.00	7.70	15.40	30.80	46.20
Civil/Structural Engineers (N=14)	14.30	14.30	14.30	14.30	42.90
Mechanical Engineer (N=9)	0.00	0.00	11.10	66.70	22.20
Electrical Engineer (N=8)	0.00	12.50	0.00	37.50	50.00
Environmental Impact Assessor (N=31)	3.20	0.00	12.90	61.30	22.60
Member of the Public/Neighbour (N=4)	25.00	0.00	0.00	75.00	0.00

Table 34: stakeholder rating of 'aesthetic value'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=23)	0.00	13.00	17.40	26.10	43.50
Architect (N=32)	12.50	15.60	12.50	43.80	15.60
Quantity Survey (N=26)	7.70	15.40	19.20	42.30	15.40
Civil/Structural Engineers (N=14)	14.30	42.90	35.70	7.10	0.00
Mechanical Engineer (N=9)	0.00	11.10	66.70	11.10	11.10
Electrical Engineer (N=8)	0.00	25.00	0.00	50.00	25.00
Environmental Impact Assessor (N=32)	19.40	19.40	9.70	38.70	12.90
Member of the Public/Neighbour (N=4)	0.00	25.00	25.00	50.00	0.00

Table 35: Stakeholder rating of 'pleasant environment'

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	0.00	8.30	0.00	29.20	62.50
Architect (N=26)	0.00	15.40	11.50	46.20	26.90
Quantity Survey (N=26)	0.00	7.70	7.70	69.20	15.40
Civil/Structural Engineers (N=14)	0.00	42.90	21.40	35.70	0.00
Mechanical Engineer (N=9)	0.00	0.00	22.20	66.70	11.10
Electrical Engineer (N=8)	0.00	12.50	25.00	25.00	37.50
Environmental Impact Assessor (N=32)	0.00	16.10	6.50	22.60	54.80
Member of the Public/Neighbour (N=4)	0.00	50.00	0.00	25.00	25.00

Table 36: Stakeholder rating of accomplishment of core business needs

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	0.00	12.50	20.80	25.00	41.70
Architect (N=28)	3.60	14.30	14.30	28.60	39.30
Quantity Survey (N=22)	4.50	4.50	4.50	13.60	72.70
Civil/Structural Engineers (N=13)	15.40	7.70	15.40	61.50	0.00
Mechanical Engineer (N=9)	0.00	11.10	22.20	55.60	11.10
Electrical Engineer (N=8)	0.00	42.90	14.30	28.60	14.30
Environmental Impact Assessor (N=32)	3.10	21.90	6.20	34.40	34.40
Member of the Public/Neighbour (N=4)	0.00	25.00	0.00	25.00	50.00

Table 37: Rating of meets stakeholder objectives and expectations

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	0.00	12.50	0.00	12.50	75.00
Architect (N=28)	3.60	17.90	10.70	42.90	25.00
Quantity Survey (N=24)	4.20	4.20	20.80	41.70	29.20
Civil/Structural Engineers (N=14)	14.30	35.70	7.10	28.60	14.30
Mechanical Engineer (N=9)	0.00	44.40	11.10	44.40	0.00
Electrical Engineer (N=8)	0.00	25.00	12.50	37.50	25.00
Environmental Impact Assessor (N=32)	3.10	12.50	0.00	25.00	59.40
Member of the Public/Neighbour (N=4)	0.00	25.00	0.00	0.00	75.00

Table 38: Stakeholder rating of flexible for future expansion

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=24)	8.30	8.30	0.00	29.20	54.20
Architect (N=31)	19.40	12.90	9.70	32.20	25.80
Quantity Survey (N=22)	4.50	0.00	22.70	40.90	31.80
Civil/Structural Engineers (N=14)	0.00	42.90	35.70	7.10	14.30
Mechanical Engineer (N=9)	44.40	44.40	0.00	11.10	0.00
Electrical Engineer (N=8)	12.50	37.50	0.00	37.50	12.50
Environmental Impact Assessor (N=32)	0.00	6.20	0.00	50.00	43.80
Member of the Public/Neighbour (N=4)	0.00	25.00	0.00	50.00	25.00

Table 39: Stakeholder rating of allowance for adequate training on effective use of project.

Stakeholder	Not Important	Important	Fairly Important	Very Important	Extremely Important
Develop (Sell/Own)(N=21)	14.30	28.60	4.80	14.30	38.10
Architect (N=32)	28.10	21.90	15.60	28.10	6.20
Quantity Survey (N=26)	15.40	11.50	19.20	46.20	7.70
Civil/Structural Engineers (N=14)	0.00	64.30	14.30	21.40	0.00
Mechanical Engineer (N=9)	11.10	11.10	44.40	33.30	0.00
Electrical Engineer (N=8)	12.50	25.00	0.00	12.50	50.00
Environmental Impact Assessor (N=32)	12.50	28.10	0.00	25.00	34.40
Member of the Public/Neighbour (N=4)	0.00	25.00	0.00	25.00	50.00

Appendix 3

3. Questionaire

Dear Respondent,

This questionnaire aims to collect information related to '**construction projects success indicators'**. The study is being undertaken by **Wesley Mokua Nyariki** for a **Master of Arts degree** in construction management at the **University of Nairobi's School of Built Environment**, under the supervision of **Prof P. Syagga** and **Qs Robert Oduor**.

The research is about considerations **('success indicators)** that have an important impact on perceptions of project success. The focus of the research is to collect perceptions of stakeholders in the building industry, on the '**success indicators'** that can be utilized in the construction industry.

The information given is for academic purposes only and will be treated confidentially. Please answer the questions according to the instructions.

SECTION A: DATA ON RESPONDENTS

1. Client/Developer ☐

    i. Developing to own ☐
    ii. Developing for outright sale ☐

2. Consultants ☐

(a) Professionals

(i)Architect ☐ (ii) Quantity surveyor ☐ (iii) civil/structural en ☐

(iv)Mechanical engineer ☐ (v) electrical Engineering ☐

(vi) Environmental impact assessment expert ☐

(b) years of experience

(i) Below 10yrs ☐ (ii) 10-20 (ii ☐ -30 (iii ☐ -40

(iv) Above 40 ☐

3. End user/occupier ☐

4 Member of the Public/Neighbor to the Building ☐

5 Contractors ☐

SECTION B

Rate the following listed project success indicators from the extremely important to the list/not important as far as construction projects are concerned

(I): PROJECT PROCESS SUCCESS

1. **'absence of any legal claims'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice--

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2. **'Minimum disputes'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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3. **'delivering the project within the budget'**

i) Not important ☐ ii) important ☐ iii) fairly importan☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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4. **'Meeting social obligations'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important☐ v) extremely important ☐

Give reasons for your choice --

----

5. **'Minimum scope changes'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

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6. **Comprehensive briefing process by the client**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

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7. **'Minimum effect to the environment'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

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8. **'Integration of design and construction'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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9. **'Meeting safety requirements'**

i) Not important ☐ ii) important ☐ iii) fairly importan ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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10. **'Efficiency in utilization of manpower'**

i) Not important ☐ ii) important ☐ iii) fairly importan ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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11. **'Efficiency of approval authorities'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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12. **'meeting quality specifications'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

----

13. **'Fast communication and decision-making process'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

SECTION B (II): PROJECT RESULTS' SUCCESS

1. **'client satisfaction'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

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2. **'user satisfaction with product'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

----

3. **'project functionality andFitness for purpose'**

i) Not important ☐ ii) important ☐ iii) fairly importar ☐ ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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4. **'absence of defects'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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5. **'giving value for moneyand profitability'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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6. **'Developing new knowledge & expertise'**

i) Not important ☐ ii) important ☐ iii) fairly importan ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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7. **'positive reputation of the final product'**

i) Not important ☐ ii) important ☐ iii) fairly importan ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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8. **'Increased levels of professionalism'**

i) Not important ☐ ii) important ☐ iii) fairly importan ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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9. **'Usable life expectancy'**

☐ ☐ ☐

i) Not important ii) important iii) fairly important

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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10. **'Lower maintenance cost'**

i) Not important ☐ ii) important ☐ iii) fairly importar ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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11. **'Aesthetic value'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

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12. **'Pleasant environment'**

i) Not important ☐ ii) importan ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

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13. **'Accomplishment core business needs'**

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

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14. **Meets stakeholders' objectives & an expectation of all stakeholders**

i) Not important ☐ ii) important ☐ iii) fairly importan ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

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15. **'Flexible for future expansion'**

i) Not important ☐ ii) important ☐ iii) fairly importan ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice ---

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16. allowance for adequate training on effective use of the project at the end

i) Not important ☐ ii) important ☐ iii) fairly important ☐

iv) Very important ☐ v) extremely important ☐

Give reasons for your choice --

Are there any other indicators you consider important and not included in the list? Please mention them and give your reasons---

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Appendix 4

4. Permit Letter for research

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123
Fax: 254-020-2213215,318245, 318249
When replying please quote

P. O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref:
NCST/5/002/R/580/6

Date:
19th November, 2009

Nyariki Wesley Mokua
University of Nairobi
P. O. Box 30197
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Success rate of Building Construction Projects in Kenya"*** I am pleased to inform you that you have been authorized to undertake your research in ***Nairobi District*** for a period ending ***31st October 2010.***

You are advised to report to ***The Permanent Secretary, Ministry of Works and The Director General, Kenya National Bureau of Statistics*** before embarking on your research project.

Upon completion of your research project, you are expected to submit two copies of your research report/thesis to our office.

PROF. S. A. ABDULRAZAK Ph.D, MBS
SECRETARY

Copy to:
The Permanent Secretary
Ministry of Roads and Public Works
P. O. Box 30260
NAIROBI

The Director General
Kenya National Bureau of Statistics
P. O. Box
NAIROBI