A FRAMEWORK MODEL FOR ACHIEVING UTILITY OF A BUILDING AT THE EARLIEST POINT IN THE BUILDING PROCESS

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A Framework Model for Achieving Utility of a Building at the Earliest point in the Building Process

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Signature:……..Date…….

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This thesis has been submitted for examination with our approval as University supervisors.

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DEDICATION

To my wonderful family and all prospective house owners in Kenya.

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I also wish to acknowledge entire staff of the Department of Construction Management who created an enabling environment for me to accomplish the mission of successfully completing the course.

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To my family, I must say thanks a lot for the encouragement which kept me going.

Lastly, any error of omission and commission in this thesis is attributable to the author

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ABBREVIATIONS AND ACRONYMS

AFDB – African Development Bank

CBK – Central Bank of Kenya

SACCOS – Saving and Credit Cooperative Organizations

PPOA – Public Procurement Oversight Authority

BOQs – Bill of Quotatives

PMI – Project Management Institute

VE – Value Engineering

ABSTRACT

Achievement of utility at the earliest in building construction projects in Kenya has hitherto been an elusive aim. When resources are not sufficient to fully complete a building as designed, it is prudent to imaginatively do the construction with a view to making the building habitable at the earliest point in the construction. However, in practice, house developers employ unstructured and ineffective ways to address this.

In this study, the researcher set out to remedy this by developing framework for achievement of utility at the earliest point in a building construction project by investigatingthe implementation methods of 30no house building projects undertaken by public servants under the Civil Service Housing Scheme in Kenya.

Review of literature on building construction delay, house construction process, utility, project success criteria and project success factors revealed the lack of a house building implementation framework in Kenya that guarantees early achievement of utility in the building process.

Survey research was employed with 30 no. projects being selected from the accessible population through non-probability quota system sampling technique combined with snowball sampling technique. Data analysis showed that 59% of prospective house owners in Kenya are pushed by high rents and social status to start construction on insufficient funds. These factors influence the completion plan one is likely to adopt as well as the level of completion (Sig. 003) and hence satisfaction that will be achieved. Further, project success factors that would most influence achievement of utility at the earliest in house construction are: project planning (0.9034), cost reduction measures (0.8897), project brief (0.8414), project scheduling (0.8345) and setting project success criteria (0.8345). These are the factors that have informed development of the house building framework by the researcher.

The model guarantees achievement of early utility thus giving financial relief to the house owner as well as alleviating costs associated with incomplete structures left in that state for long.

As prospective house owners who commence construction on insufficient funds aim at occupying their houses before completion because of the pushing factors, adoption of the thirteen-step house building framework model developed in this study is therefore recommended.

CHAPTER ONE:

INTRODUCTION

1.1 Background

The construction industry plays an important role in the economy of any country world over in that its activities are vital to the achievement of national socio-economic development goals of providing shelter, infrastructure and employment (Oladinrin *et al*, 2012). By so doing it affects nearly every aspect of the economy and therefore it is vital to the continued growth of the same. A modern, efficient infrastructure is a key driver of productivity, and as such construction industry has a major role in delivering the built infrastructure in an innovative and cost effective way (Lawson, 2013).

Further, productivity depends on the efficiency and nature of the built environment and hence the need for properly configured and located houses and premises (Lawson, 2013). This explains why a number of companies have housing schemes to provide their staff members with quality shelter as a way of motivating them.

The industry however has not been able to provide the adequate shelter in Africa due to rapid urbanization at rate of 40,000 people per day (AfDB, 2013). This obviously is bound to have an effect on the rents in general.

The rents in urban areas are very high and not commensurate with the quality of the accommodation (Shelter Afique, 2014). Moreover, the rents keep on going up due to a number of factors chief among these being inflation as well as short supply of housing units annually (Shelter Afrique, 2014). According to housing survey of 2011 conducted by the Ministry of Housing, supply stands at 50,000 units against a demand of 200,000 housing units annually (Republic of Kenya, 2015). Other factors contributing to the high rents are high interest rates charged on construction loans (AfDB, 2013) and income tax which the government has insisted must be paid (Finance Act, 2014). Tenants have no choice but to pay the new rents adjusted

upwards or else one gets evicted. Therefore, the pressure to move out to your own house is extreme.

The Government of Kenya has taken cognizance of this and pledged to facilitate greater access to funds from the domestic market but nothing has changed (Republic of Kenya, 2004; Republic of Kenya, 2008). One of the measures the government took towards this end was to relax pension funds rules in 2009, allowing workers to borrow house loans secured by their retirement savings (Retirement Benefits Authority, 2009). The insurance industry and the government should explore the possibility of allowing the clients of the former be able to use part of their life cover as collateral to access mortgage loans (AfDB, 2013). Other sources of finances available to prospective house owners are ones savings, Savings and Credit Cooperative Organizations (SACCOs) and housing schemes run by employers, for instance The Civil Servants Housing Scheme for Government of Kenya employees.

The challenges faced by the private developers are not any different particularly in the area of accessing funds for construction. The interest rates on bank loans are far too high and currently range between 21% and 26% (CBK, 2012). Consequently, developers are under extreme pressure to complete the construction and start loan repayment and therefore delay in occupation due to non-completion or stalling of the project would be financially disastrous. In some cases, the developers do not access loans to meet the entire budget of construction due to the high cost of finance implying that the projects stall unless they inject funds from own equity (CBK, 2009).

Besides high rents, peer pressure also contributes to people starting their house building construction projects albeit on inadequate funds in spite of correct advice from consultants. This factor is related to social status which also has been known to influence quite number of prospective house owners (Durmaz & Tasder, 2014).

Owing to existence of building regulations in urban centres, people constructing their own houses in those areas usually consult professionals for advice on the designs as

well as the cost of their projects (Republic of Kenya, 1968). However people do ignore the input from consultants due to their lack of understanding of what building construction entails and since they consider the exercise as simple one, they therefore don't understand the importance of the building consultants. In spite of that, building construction is complex and requires experts to plan, budget and supervise implementation if one is to achieve set objectives (Shirazi & Hampson). In fact effective planning has been linked to enhanced construction project performance resulting in benefits such as cost, time saving, clearer project definition and a reduction of change order frequency (Brian *et al*, 2015).However, there has been cases which have shown that poor estimation on the part of the consultants has contributed significantly to the delay and/or stalling of building construction projects (Kivaa, 2000).

For public building construction, the challenge is not lack of adequate funds *per se*, since the procuring entity is supposed to ensure availability of the same before entering into any contract (PPOA, 2005). However, the funds from Treasury are disbursed in two tranches for development projects. Further, release of the first tranche in the beginning of a financial year is not immediate and can delay for up to six months. Consequently, the construction is delayed or stalled for some time hence denying services to the people (Mbatha, 1986). The big projects with contract periods of one year and above are the most affected by this phenomenon.

Developers usually engage consultants who are meant to plan for the project to adhere to the four parameters of scope, time, budget and quality. This implies that they must identify the project deliverables based on the scope, come up with project plans and also the budget- a key component of project implementation considering that the developer may have obtained a construction loan (Akhilesh, 2014). The four parameters form the project management triangle of constraints which clearly illustrates their competing nature (Figure 1.1). This competition aspect calls for skillful balancing of the constraints throughout the project lifecycle by the project manager (Lock, 2007). Therefore, the success of projects will traditionally depend on these four parameters (Lock, 2007).

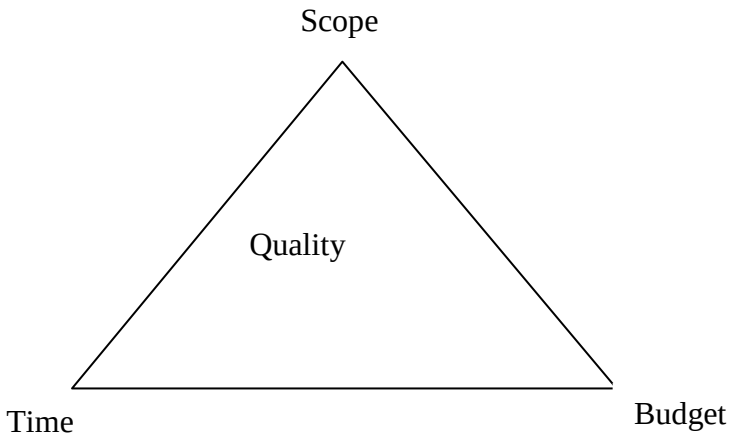

Figure 1.1: Project Management Triangle of Constraints

(Helman, 2002)

However, project success goes behold the four primary objectives of scope, time, budget and quality to meeting or exceeding the expectations of the stakeholders (Lock, 2007). These are client, residents, consultants, local authority and financier (Helman, 2002).

From the point of view of most stakeholders, an incomplete project has failed because it does not meet their expectations. To the client – occupation of the building; to the residents – the incomplete building is an eyesore and a security risk; to the consultants – their reputation; to the local authority – the beauty of the built environment; and to the financiers – repayment of the loan advanced may be a problem and if the financier is the employer, then the objective of the scheme which is mainly motivation to the employee is not achieved.

Of all these concerns, utility is the overriding one since all the others depend on it. This is so because the client is the key stakeholder and his main objective is to start utilizing the facility.

In economics utility is synonymous with "satisfaction", well-being, happiness and pleasure. This implies that we can increase our utility by undertaking enjoyable activities or purchasing things we desire (Arie, 1985). Therefore by deciding to

undertake construction of a house, an individual is trying to enhance his utility and this will be possible if one achieves usability of the house.

From project management point of view, one would therefore have expected utility to be given priority over one or all the other four parameters in a tradeoff decision and consequently allocate more resources towards achieving it (Lock, 2007).

1.2 Statement of the Problem

The implementation method in projects undertaken using insufficient funds is not effective in the sense that it fails to achieve utility in most of the cases in spite of the extreme pressure the owners may be under particularly for those who may have taken bank loans. An indication of this failure is the incidences of unoccupied incomplete structures where the owners had hoped to attain habitability. Anecdotal evidence indicates that this phenomenon is common in estates where prospective house owners decides to undertake the construction of their houses instead of buying (Olingo, 2011).

Under normal circumstances, utility of the building is not a major concern as it is assumed to be automatic once the project deliverables have been achieved within or without the primary objectives (Abdullah et el, 2006). Yet, quite a number of the developers will undertake construction starting with insufficient funds. A large percentage of these projects stall before reaching levels where they can be occupied or produce utility to an owner who is constrained by insufficient funds.

In the case of public projects, the loss in terms of social benefits could be huge. Since the projects are started after identification of a public need for which other alternatives such as use of existing facilities and leasing of appropriate facilities are not feasible, then delayed occupation due to non-completion means delayed services and hence more suffering to the people (Mbatha, 1986).

What is apparent therefore is the lack a structured approach in form of an implementation framework model that would guarantee utility of the structure at the earliest point possible in the construction process with whatever amount.

1.3 Research Aim and Objectives

The aim of this research is to develop a frame work model for implementation of housing projects in such a way that the client may achieve utility earliest in the construction process. The specific objectives are;-

1. To identify the various implementation methods used in house building.
2. To determine factors that lead to prospective house owners starting the construction with insufficient funds to complete the projects.
3. To compute the correlation between factors that leads to starting house construction with funds insufficient to achieve practical completion and the implementation methods.
4. To rate the importance of various success factors that influence achievement of utility at the earliest in house construction started on insufficient funds.
5. To develop a house building implementation frame work model for projects that will enable achievement of utility at the earliest point possible.

1.4 Hypothesis

1. The level of utility achieved in house construction is influenced by the degree to which “earliest achievement of utility” is incorporated in the planning, design and construction of the house.

1.5 Justification and Significance of the Study

The failure to achieve utility in building construction projects has several consequences which this research sought to address.

First and foremost, the resulting incomplete structure will definitely deteriorate with time and the longer it stays in that state the more it will cost to complete it due to the

repairs one may have to undertake to restore it. Other extra cost associated with a stalled project is on lost materials through pillage, vandalism and vagaries of weather not to mention the costs of having to mobilize again. This state of affairs is grave considering that the developer already has difficulties in raising funds. Therefore the results of this study will go a long way in mitigating against risks inherent in project implemented starting with insufficient funds.

In addition to the problem of extra costs, the incomplete structures poses security risks to the neighborhood because criminal elements are known to take refuge in them unless the owner arranges for security to be stationed there adding to more extra cost. In some instances, residents have been known to burn the property when the security problem got out of hand. The residents are also concerned with the beauty of their built environment which is compromised by the incomplete structures as they are eyesores. Some of these incomplete structures can remain in that state for very long as the owners seek funding to complete them hence the justification for concern of the residents. This research will contribute to preservation of the beauty of the built environment.

The aforementioned issues coupled with the uncertainty of when the project will be completed are enough to cause emotional stress to the owner. For those who may have taken bank loans to finance the construction, the financial stress they undergo is made worse by the specter of increase in the mortgage rates which in the first place are exorbitantly high.

Using the developed implementation framework, contractual claims and disputes due to delays caused by inadequate funds will not arise as the entire building construction project is treated as a program that contains several projects.

For public projects, people will be able to start receiving services early in the course of construction.

Therefore, an effective project implementation strategy for the projects started on insufficient funds is going to mitigate against all the aforementioned in that one will

be able to utilize the facility at various stages of completion. Moreover, it will assist employers in achievement of the main objectives of the staff housing schemes which is comfort for their staff leading to increased staff morale.

1.6 Scope of the Study

The research looked at the implementation methods of 30 purposefully selected projects under the Civil Servants Housing Scheme which had been underfunded in Nairobi since the inception of the program in 2008. This Scheme was chosen because of the ease of access to information and moreover the characteristics of the problem are the same regardless institution involved. The research involved studying archival documents, visiting the sites and interviews of owners, consultants, contractors and financier represented by the managers of the scheme.

The target population was all building construction projects implemented starting within sufficient funds to complete them in the country whereas the accessible population was all similar projects undertaken in Nairobi under the Civil Servants Housing Scheme since the inception of the program. Accessibility of documents was the reason behind selecting this scheme for the study. Therefore the period considered was from 2008 to 2014.

A qualitative survey research method was adopted since the research was more interested in an in-depth understanding of the problem and further there were various factors involved (Kothari, 2004). Areas that were covered are;-

i) Factors that influenced someone to commence construction of their house with insufficient funds.
ii) The completion plan one had.
iii) The construction strategies they had employed.
iv) The cost reduction methods they had considered.
v) Level of completion they had achieved and their satisfaction level.

For the purpose of this research, the following terms are defined as follows:

Civil Servants Housing Scheme refers to a program within the Ministry of Land, Housing& Urban Development that is meant to facilitate public servant with funds to construct their own houses at subsidized rates of 5%annual interest in addition to providing rental houses to them (Republic of Kenya,2013).

Delay refers to the time during which completion of some part of the construction project has been extended or not performed due to unanticipated circumstances (PMI, 2000).

Lean construction refers to a production management based approach in project delivery which emphasizes on minimization of wastes and maximization of the value of the product by taking building construction projects as production systems (Lean Construction Institute, 2012).

Ministry of Land, Housing and Urban Development refers to the Ministry with the mandate of development of housing through National Housing Corporation (NHC), facilitating housing finance among others (Republic of Kenya, 2013).

Nairobi was taken as the metropolitan town with several local authorities among them City Council of Nairobi, Mavoko Municipal Council, Machakos Municipal Council, Kiambu Municipal Council and Thika Municipal Council (Republic of Kenya, 2008).

Utility in this case refers to usability, occupiability or habitability of a building (Witztum & Young, 2013).

1.7 Limitations

This research encountered a number of challenges:

i. Access to archival information like drawings and records for the projects. This was occasioned by mainly two problems. Storage of documents was one of them. The clients (owners) expected the consultants to keep all the contract documents and vice versa so you get tossed form one party to the other. On the part of the consultants, they couldn't release any document

without the client's consent. Poor project management was the other problem in that quite a number of projects didn't have clerk of works and therefore no site weekly reports. Other documents totally missing were the project briefs and this was because they had not been put down in writing.

ii. Budgetary constrain. With limited resources available, the research had to restrict itself to projects done in Nairobi. Outside Nairobi would have required not only transport and living expenses but also hiring research assistants in order to remain within the set timelines.

1.8 Outline of Research

This thesis is structured in five chapters with appendices placed at the back after chapter five. Chapter one sets out the problem and what the research seeks to achieve. It also defines the scope of the research as well as its justification and the limitations encountered.

Chapter two is about studies done by other people and that are related to the problem. Specifically areas covered are causes of construction delay, role of project management in project success, project success factors and cost reduction methods. Here the research gap is established and the research variables identified.

Chapter three deals with the methods and tools that were employed in carrying out the research. The research design is outlined as well as the data collection and sampling techniques. The last section of this chapter details the methods of data analysis.

Chapter four covers the research findings. Here the results are presented after being analyzed critically to establish any relationships and the meaning of the data.

Chapter five is about the conclusion and recommendations which is in form of a house building implementation frame work model in line with the overall aim of the research. Suggestions on areas of further research are also given in this chapter.

Finally references and bibliography as well as appendices are annexed to this research report.

CHAPTER TWO:

LITERATURE REVIEW

2.1 Introduction

The literature review starts by focusing on the factors that bring about allocation of insufficient funds for projects and their influence on project implementation. It goes further to look at the role of project management in achieving success in projects. Project success criteria and success factors are distinguished as the review endeavors to identify factors that would positively influence project success. Since the research is on insufficiently funded projects, the chapter concludes by reviewing literature on cost reduction methods and then puts forward the research gap.

2.2 Building Construction Delay

A number of studies done on the causes of delay and/or stalling of building construction projects in various parts of the world have identified financial problems as one of the key factor contributing significantly to this phenomenon [Salleh, 2009; Tumi et al, 2009; Republic of Kenya, 2006].

The financial problems are in several aspects like delay in payment to contractors, funding procedures and inadequate funds (Talukhaba, 1988; Mbatha, 1986). The other aspect is poor estimation of the cost of building construction.

For the case of insufficient funds, it is clearly exemplified by the effects on construction industry courtesy of the world economic down turn of 2008. In America, Harvard University had to reconsider the scale and pace of planned capital projects and even shelved construction of a new campus (Wolinsky, 2009). Princeton University was forced to postpone major construction projects (Wolinsky, 2009). Similarly, in Egypt companies engaged in development of houses declared that the dates for delivery of housing units had to be postponed or rather delayed for periods of up to 15 years (Mansour, 2011).

In Kenya, cases of insufficient funding for construction projects are not rare. This problem of insufficient funds is cited in the construction of Isiolo County Hall which commenced in 2005 and was targeted for completion in 2 years, which is by 2007. To date the project is 90% complete with a few offices in use albeit with finishes still outstanding (Republic of Kenya, 2012).

In a case study conducted from Vietnam on large construction projects in developing countries, poor estimation was identified as one of the problems in construction industry that causes delays (Nguyen *et al*, 2004). It can actually lead to total stoppage of the construction once the funds allocated are exhausted considering that the allocation was based on the poor estimate.

In Kenya, implementation of public building projects is affected by the funding procedures in which case the projects start on low funds and worse still the rate of expenditure is more than that of releasing funds thus causing delay (Khang'ati, 1986).A case in point is the health centres projects undertaken in each constituency through the Economic Stimulus Program. Their funding was in two equal tranches of kshs 8 million coming in two different financial years 2009/10 and 2010/11. These projects delayed in completion because the second tranche of the funds was released four months into the second financial year that is 2010/11. This meant that the contract periods averaged between 12 months to 14 months against the original 8 months (Republic of Kenya, 2011). Hence the people were denied services for close to 6 months.

2.3 Factors That Cause Start of Housing Projects with Insufficient Funds

For individuals, in particular those funded by their employer to construct their own houses, financial problems will mainly manifest in form of inadequate funds and this phenomenon is precipitated by a number of factors;

1. Peer pressure- Where the client decides to start construction due to peer pressure and disregards the fact that the construction budget for the house he intends to build is more than the amount of loan he qualifies for. This is so

because peer groups are viewed as independent psychological entities with collective consciousness and collective behavior and hence the influence in ones behavior in the group (Smith *et al*, 1999; Scheidlinger, 1974).

2. Ignorance- the client limited building construction knowledge means that he may not understand the complexities of the venture thereby underestimating the time and cost requirements even when advised otherwise by the consultants. This is because the building construction industry involves complex technical knowledge and construction processes (Shirazi & Hampson, 1999).Others will ignore their consultants and engage "quacks" to manage their construction citing high consultancy fees.
3. High rents- financial difficulties faced by some people making them strain in paying house rents which have been increasing over the years and between 2010 and 2012 went up by nearly two (2) times (CBK, 2009).This has been caused by a huge demand and supply gap of housing which currently stands at 150,000 units (AfDB, 2013). As a mitigation measure people are forced to consider construction of their own houses with whatever funds available with the intention of moving in as soon as it becomes slightly habitable.
4. Poor estimation of the construction cost of the house on the part of the consultants engaged to manage the construction (Kivaa, 2000).
5. Lastly, poor documentation by the consultants especially the design and specifications. The cost of construction is bound to escalate due to the many change orders that occur as a result of those design errors (Love *et al*, 2008).

These factors are likely to influence the way those employer funded house constructions are implemented, how soon utility is achieved and by extension the level of completion to be achieved. The research will endeavor to establish that relationship.

For a project that is insufficiently funded and above all with the funds coming from the employer, achievement of utility would be of paramount importance and most likely the project would be considered a success by both the key stakeholders, that is the employer and the member of staff.

To understand the shortcomings of the implementation methods of house construction, there is need to look at the house construction process.

2.4 House Construction Process

A prospective house owner will initiate the project by developing the brief which he then shares with the architect/project manager. The brief captures his dreams and usually is not guided by the funds available. This is so because construction is complex (Thyssen *et al*, 2010) and this being the case therefore the developed brief is likely to be defective unless the architect takes charge of the process (Lock, 2007).

The importance of a good brief is underscored by the fact that success of a project in terms of function, quality, cost and time highly depends on it (Chandra & Loosemone, 2011). This therefore implies that the aspect of insufficient funds need to not only come out at brief development stage but captured clearly.

The architect will then design based on the brief from the prospective house owner which spells out his needs and requirements. It then follows that a badly written brief will lead to erroneous documentation (Love *et al*, 2008) particularly the designs and drawings in that they may not factor the aspect of insufficient funds.

Upon approvals of the designs and drawings by town administration, the client will proceed to get cost estimates as well as a priced BoQs. These two documents (approved drawings & priced BoQs) are the only ones required by financier for loan consideration. Since the amount of loan one qualifies for depends on the ability to pay back the loan based on the salary (Republic of Kenya, 2012), the tendency by most of the prospective house owners is to adjust the cost estimate and the BoQs to that amount. This is in spite of the many studies pointing to the fact that design errors and poor project cost estimates are sources of change orders, variations, and disputes as well as stalling of construction projects (Enshassi *et al*, 2009, Love et al, 2008, Nguyen *et al*, 2004). The implication of this is that practical completion is not guaranteed unless one injects more funds into the project.

Furthermore, utility may not be achieved as it will depend on the level of completion of the house attained. By deciding to undertake construction of own house, an individual's desires is to enhance his own well-being and by so doing achieve more happiness and pleasure (Arie, 1985). If utility is not achieved therefore, the project may be considered a failure.

Depending on the factor pushing one to construct own house, some people will occupy their incomplete houses in spite of existing building bylaws prohibiting that (Nairobi City County, 2015). This can be witnessed in many new estates of City of Nairobi (see fig. 2,1).

Figure 2.1: Occupied incomplete houses in Nasra Estate, Nairobi (source; Author, 2013)

Figure 2.2: Construction of flats in Umoja Innercore estate, Nairobi. Notice that lower flows have been occupied and the building is incomplete

(source;Author,2013)

This scenario obtains as people obviously take advantage of the laxity of local authority officials (Omenya, 2006). The implication of this is that the occupants are exposed to risks. Worse still some of the buildings may take long to complete hence adversely affecting the beauty of the built environment (figure 2.2). These projects may be considered to have failed depending on the various stakeholders involved. This therefore calls for a look at utility in general and its relationship with buildings.

2.5 Utility

In life people aspire to achieve more comfort by toiling and moiling daily to better their wellbeing and therefore it's always a pleasure once one is able to achieve this. All these, "pleasure", wellbeing, comfort as well as happiness which one feels on attaining set target, are synonymous with utility in economic terms (Arie, 1985). Utility is also defined in terms of preferences and therefore an individual can increase his utility by choosing to undertake certain activities or purchase goods he desires(Witztum & Young, 2013).

When one decides to construct a house, the intention is to better their wellbeing and by so doing increase their utility economically. This implies that maximum "pleasure", "comfort" or "utility" is achieved when practical completion of the house is attained as one is able to occupy or use it. Achievement of utility in house construction is therefore synonymous with occupiability or usability of the house and so one can be said to achieve utility even when the house is incomplete(Witztum & Young, 2013).

It then follows that depending on the factor pushing one to undertake house construction, achievement of utility is a key determinant in declaring the project a success. Literature on project success is reviewed next.

2.5 Project Management in Achieving Project Success

Over the years, project management has been recognized as an efficient tool to handle projects. The role of project management is to define the requirements of the work, establish extent of the work, allocate the resources required, plan and execute the work, monitor progress and adjust deviations. It is concerned with identification of the client's objectives in terms of utility, function, quality, time and cost, and the establishment of relationships between resources (Munns *et al*, 1996). Further, project management is essential to the outcome of the project because it is the integration, monitoring and control of contributors to the project and their output, and the evaluation and selection of alternatives in pursuit of the client's satisfaction (Walker, 1984).

Project management is accomplished through the use of the processes such as: initiating, planning, executing, controlling and closing (PMI, 2000). Therefore, the project team manages the work of the projects, and the work typically involves competing demands for scope, time, cost, risk and quality, stakeholders with differing needs and expectations and identified requirements (PMI, 2000).

The initiation stage in project management process is the foundation stage that should result in a specification written in sufficient detail to define the requirements

and scope of the proposed project, list the principal tasks and outline the intended strategy for designing and executing the work (Lock, 2007). Planning, execution and control form the primary processes. The most important of the three is planning as is evidenced by the many core sub processes namely: scope planning, scope definition activity definition, resource planning, activity sequencing, activity duration estimating, schedule development, cost budgeting and project plan development (Devaux, 1999; Koskela & Howel, 2002). Execution and controlling have one and two core sub-processes respectively.

The output from the ten core sub-processes of planning, the project plans, and make up an input to the executing processes (OPMI, 2000). This is so because, during execution stage the project team implements the project plans upon getting approval for the same and the product oriented documents like drawings and specifications (Koskela & Howel, 2002; PMI, 2000). However, translating from plans to action is only possible if resources are actually available thus one of the functions of execution would be to assure the integrity of tasks in inputs (Koskela & Howel, 2002).

Controlling has two core processes: performance reporting and overall change control. Bases on the former corrections are prescribed for the executing processes and based on the latter, changes are prescribed for the planning processes (Koskela & Howel, 2002).

It is easy to see that the primary processes form a closed loop: planning processes provide a plan that is executed by the executing processes and variances from the baseline or requests for change lead to correction in execution or changes in further plans (figure 2.3).

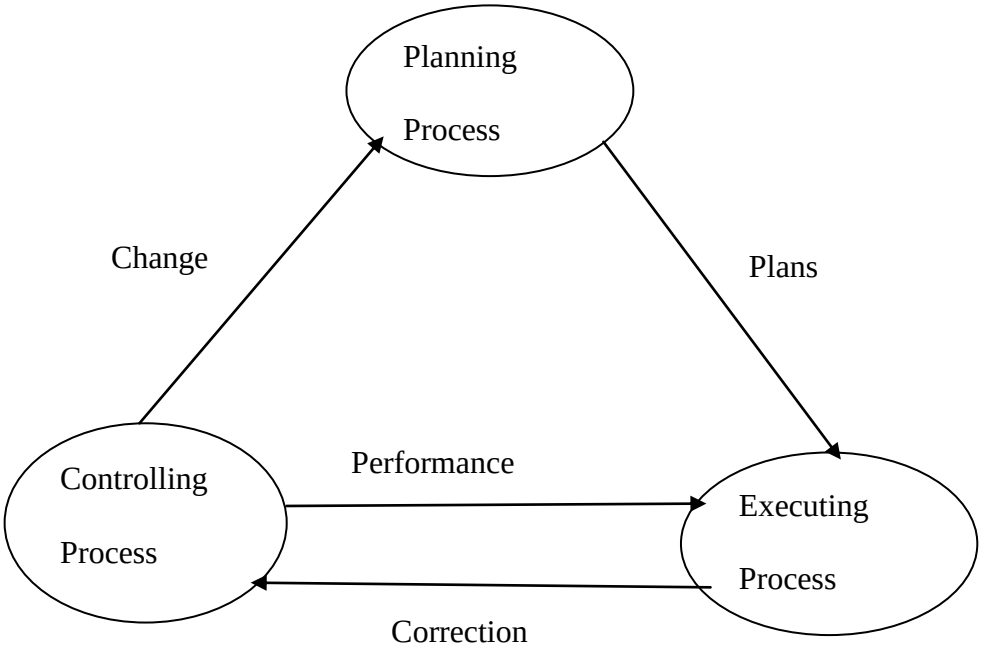

Figure 2.3: Managerial Process in project management according to PMBOK Guide (Koskela,2002)

The connection between project management and project success can actually be seen in the former's definition: the planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to the specified cost, quality and performance (British Standards 6079, 1996).

Studies have shown that the rate of success across three areas namely performance, presence indices and financial returns increases with the use of project management practices for organizations in construction industry (Cook, 2004). This implies that the adoption of project management practices has a positive impact on project success. Further, it is seen to be the tool or method or technique to solve complex organization problems (Soderlund, 2004).

However, successful project management techniques will contribute to the achievement of projects but project management will not stop a project from failing to succeed (Abdullah *et al*, 2006).

Project management literature often confusingly intertwines two separate dimensions of project success – product success and project management success (Baccarini, 1999). Product success deals with the effects of the project's final product namely project goals, project purpose and satisfaction of stakeholders' needs. Project management success focuses upon the successful accomplishment of cost, time and quality objectives, traditionally referred to as the Iron Triangle (fig. 2.4).

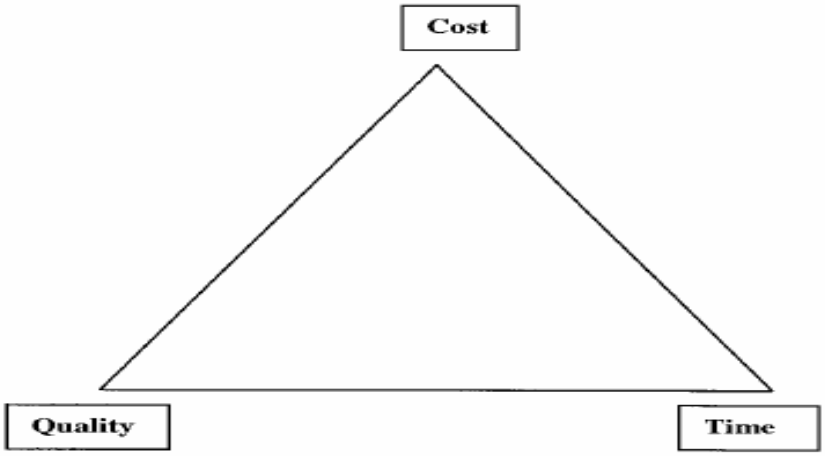

Figure 2.4: Iron Triangle (Source: Atkinson, 1999)

People rarely agree on the exact meaning of project success partly because few think about it seriously (Liu & Walker, 1998; Wateridge, 1998). The concept can mean so much to so many different people because of varying perceptions (Albert, 2001; Liu, 2005).

Apparently determining whether a project is a success or a failure is far more complex. There can be ambiguity in determining and measuring the success or failure of a project. A project that is perceived as a success by a project manager and team members might be perceived as a failure by the client (Abdullah & Ramly, 2006).

In Kuala Lumpur, the completion of development of a shopping complex was delayed by three months with an additional cost of approximately half the contract sum which includes contractual claims from the contractor (Lim and Mohamed,

1999). Both the developer and contractor suffered losses and from their respective perspectives the project has failed. However, the perception of the overall project by the users and stakeholders is very different in that the project is a big success.

The construction of the Thika superhighway in Kenya can be viewed as a failure on the part of project management team by virtue of exceeding both cost and time. The initial contract was kshs. 27 billion and this was increased to ksh.31 billion by the time of completion. As for the contract period, it was extended by almost 2 years (www.nation.co.ke, accessed on 20th November, 2012). However, the general feeling of the users is that the project is a success due to the fact that traffic congestion has been greatly reduced thus shortening the time of travel between the towns of Thika and Nairobi. The other stakeholder, Kenya Vision 2030 Secretariat is happy because it views completion of the project as a springboard to realization of Kenya's economic blueprint which is Vision 2030 (www.nation.co.ke, accessed on 20th November, 2012).

This implies that project success depends on who ask the question and who decides on the criteria of project success and therefore a project can be a success for one party and a failure for another (Atkinson, 1999; De Witt, 1988).

Project success tend to be long-term nature oriented towards the expected total life span of the completed projects while in contrast, project management success is oriented towards planning and control in the context of the short-term life of the project development and delivery (Abdullah & Ramly, 2006).

Time, cost and quality are the basic criteria to project success; nearly every related article mentions these three and point out the importance of them in a construction project and in the views of project participants (Walker, 1995; 1996; Belassi & Tuker, 1996; Hatush & Skitmore, 1997). These three criteria are the 'Iron Triangle' (Atkinson, 1999).

It can therefore be concluded that project success is wider than project management success as the latter's criteria mainly encompasses project cost, time and quality. The

former goes beyond these and includes other measures, such as safety of the users, functionality, customer/public satisfaction, location of construction, etc. (Albert, 2001, Wai *et al*, 2013).Success criteria are therefore reviewed further.

2.6 Success Criteria and Success Factors of Building Construction Projects

For over 50 years, project success has become inextricably linked with the Iron Triangle of cost, time and quality (Atkinson, 1999; De Wit, 1988). The traditional view for project success is to deliver projects on time, in budget and to scope (Morris, 2001). Most of the early studies assumed that if project completion time exceeded its due date, or expenses overran budget or outcomes did not satisfy a predetermined performance criteria then the project was assumed to be a failure.

Going to the 60's and 70's the outlook regarding the components of project success began to expand beyond the time, cost and quality attributes. Studies began to focus on management methodology in organizations and how they can be applied and reproduced to ensure success in subsequent projects (Liu, 2005). It was discovered that project management techniques and control determine project success (De Wit, 1988).

In the 1980s until late 1990s, further studies begun to research deeper in defining project success, where it was concluded that apart from the iron triangle of time, cost and quality, and project management techniques, other dimensions affect the success or failure of a project. Several experts began to link project success to stakeholders. Client's role in project success had been that oversimplified (Cherns & Bryant, 1984).

The terms of cost, schedule and technical objectives was considered and outdated belief as there are needs, concerns and issues from the diverse mix of the project stakeholders (Truman, 1986). The objectives of all stakeholders of the project should therefore be included (De Wit, 1988). Understanding and meeting the disparate needs of clients and other stakeholders is critical to the success of construction projects and for the construction industry overall (Seaden *et al*, 2000).

Further, it can be said that the attributes of project success is in achieving the project objectives measured through the level of satisfaction expressed by the stakeholders (Belout, 1998). Therefore, being able to manage construction stakeholders expectations and concern is a crucial skill for managers of construction project as failure to address these has resulted in countless project failures, primarily because construction stakeholders tend to have the resources and capability to stop construction projects (Vinten, 2000; Bourne & Walker, 2005; Lim *et al*, 2005).This implies that to ensure project success, stakeholders should be identified and their needs and expectations are determined, influenced and managed (PMI, 2000). The satisfaction of all stakeholder or rather meeting customer expectations is synonymous with project success (Van Aken, 1996; Kerzner, 2003).

Stakeholders, include clients, project managers, designers, subcontractors, suppliers, funding bodies, users, owners, employees and local communities (Newcombe, 2003).By late 1990's and the turn of the century, researches began to differentiate between the variables affecting project success .It was concluded that for projects to be implemented successfully, the two components of project success must be clearly defined, agreed and progressively reviewed by all parties. These two components are the project success criteria relating to users and sponsors and the project success factors that are required to deliver those success criteria (Wateridge, 1995).

The difference between success criteria and success factors is that success criteria is the set of principles or standards by which judgment is made and success factors is the set of circumstances, facts or influences which contribute to the result. The criteria are the conditions by which judgment are made on whether the project is successful or not while the factors contribute to the achievement of the success criteria and are the influential forces which either facilitate or impede project success. The success factors don't form the basis of judgment (Lim and Mohamed, 1999).

It is therefore important to distinguish between the two components of project success namely the success criteria which is the benchmark to measure or judge

success or failure and success factors which are the management inputs and systems that would lead to project success (Cooke-Daves, 2002).

The two components of project success can be termed as the "What" and the "How". For a project to be successful, it has to identify and focus on: firstly the result areas that is the success criteria which is termed as the "What" and secondly, the organizational areas that is the success factors which is termed as the "How" (Westerveld, 2003). Westerveld proceeded to construct what he called Project Excellence Model (figure 2.5).

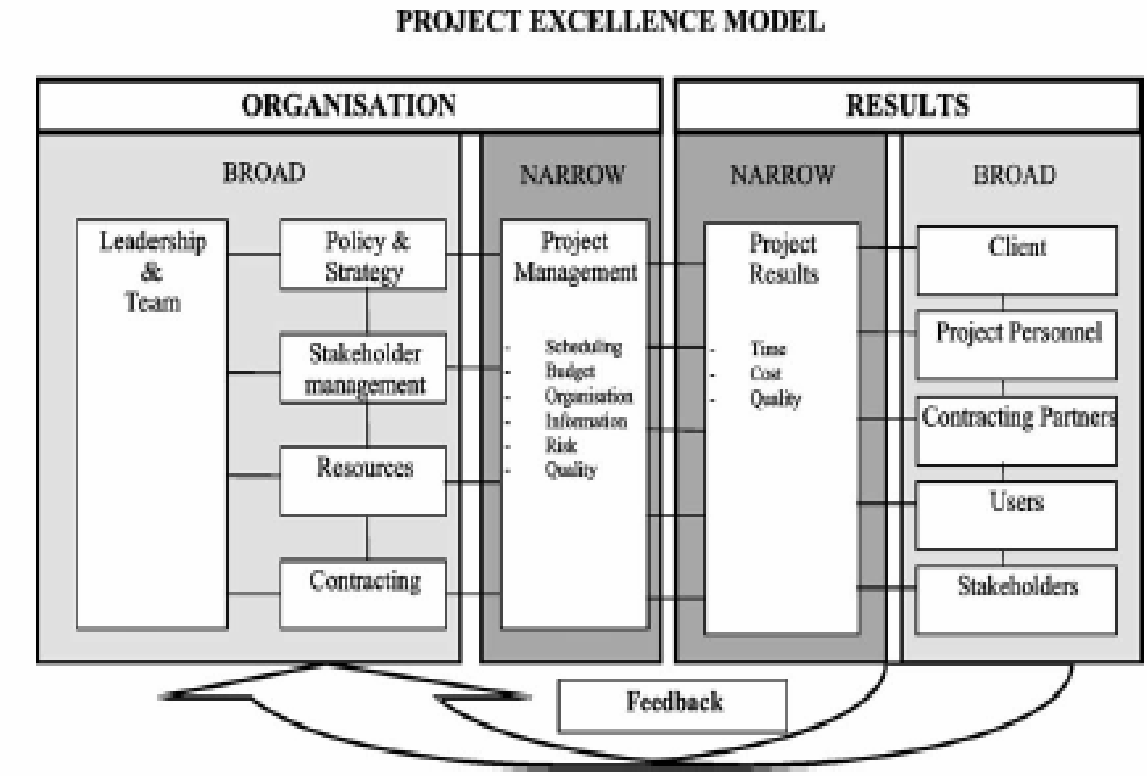

Figure 2.5: Project Excellence Model (Source: Westerveld, 2003)

This Model links all the variables of project success which is demarcated as success criteria and success factors in one coherent model which he called the Project

Excellence Model. The model consists of six result areas covering project success criteria and six organizational areas covering critical success factors.

The project excellence model shows the broad and narrow perception of project success criteria, that is result areas and critical success factors which are the organizational areas. The model shows that the narrow concept of project success criteria being the triple objective of time, cost and quality could be achieved by the narrow concept of critical factors of project management which only encompass scheduling, budget, organization, information, risk and quality. The model attempts to show that both the broad and narrow concept of success criteria could only be achieved if the critical success factors also include leadership and team, policy and strategy, stakeholder management, resources and contracting.

Success criteria relate to users and sponsors and are the set of principles or standards by which judgment is made as to whether the project is successful or not and thus it is the benchmark to measure success or failure (Wateridge, 1995; Lim and Mohamed, 1999; Coke-Daves, 2002). In brief, success criteria are the result areas of what is to be achieved thus termed the "What" (Westerveld, 2003).

In a study contacted on critical success criteria amongst project managers the ranking was appreciation by stakeholders, meets the required Quality, completes within Budget, completes within Schedule (Abdullah & Ramly, 2006). This clearly points to the importance of agreeing with the client at the beginning on the targets to be achieved at the end of the project.

Success factors are those elements that are required to deliver the success criteria and they are the set of circumstances, facts or influences which contribute to the result or the achievement of the success criteria (Wateridge, 1995; Lim & Mohamed, 1999).Success factors are the influential forces which either facilitate or impede project success, however they do not form the basis of judgment rather they are the management inputs and systems that would lead to project success (Lim &

Mohamed, 1999; Cooke-Daves, 2002). They refer to the organizational areas termed as the “How” (Westerveld, 2003).

From project excellence model these factors are management inputs and systems (scheduling, budget, organization, information, risk & quality), policy & strategy, stakeholder management, resources, contracting and lastly leadership & team. The management inputs& systems can be summarized into the three core processes namely planning, execution, and controlling.

Another study identified the following variables that influence project success or failure: i) information, planning and procurement (ii) technology (ii) design (iv) requirements management (v) project measurement criteria and (vi) project complexity (Ojioko *et al*, 2007).

Before expounding on the “How”, the success factors, it is important to review literature on the elements of “What” that is the project success criteria as it depends on the former.

2.7.0 Project Success Criteria

2.7.1 Cost

Project cost is the total amount of resources required by the client to undertake the construction so as to achieve the identified objectives. It is arrived at by breaking the entire project into activities and steps and then allocating resources required for each (Akhilesh, 2014). It is important therefore that the expert gets it right because any overrun may lead to stalling of the project because the client may have not easy access to more funds.

Unfortunately a lot of the studies done over the years have shown that many projects experience cost overruns. Main reasons for this phenomenon are underestimating, poor documentation, change orders and delay in decision making. The first two are attributed to negligence by the consultants who can be held liable. Clients are the

main culprit when it comes to change orders and this therefore call for thorough identification and definition of their needs at initial stages. While delay indecision making can be occasioned by either client or/and consultants. A communication strategy will go a long way to mitigate this problem.

2.7.2 Time

Time or rather contract period in a project refers to the total time required to complete a project. It is arrived at by breaking down the scope into various interrelated activities, sequencing them then allocating time required to perform them. Consideration is of course given to the fact that some of the activities will overlap. Of importance in this exercise is the understanding of general productivity levels of the labourers to avoid over allocation of time resulting in wastage of labour which is against lean construction principles (Sheden, 1987).

It then follows that the time set assume optimum levels of production on the part of all the members involved in the construction and any overrun will likely result in increased project cost arising from labour plus extended preliminaries. Hence the need to delivery projects on time because time is money (Sheden, 1987).

However, there is evidence showing that the majority of the building projects usually cannot be completed within the stated contract period (Shen *et al.*2001). The variation of construction time from the planned schedule can affect the interests of all parties involved in a building project. Previous studies suggest that delay in the completion of construction projects could be the greatest cause for extra cost, and loss in financial return and other benefits from a project (Shen 1997).

These factors that have been found to contribute to this phenomenon can be broadly grouped in the areas of project condition, client, design, contractor, materials supplier, labour, plant/equipment, and external environment (Wang *et al*, 2003). There is therefore a need for the project manager to develop a risk management strategy to deal with each of these factors if the project is to be delivered on time.

2.7.3 Quality

Quality is the third element of project success criteria forming the "Iron Triangle" of project management as developed by Atkinson also known as the internal or classical criteria (Thi & Swierczek, 2010). The other elements are time and cost and are subordinate to quality which is the primary success measure of project managers. This is so because a project may fail in the criteria of time and cost but be considered successful by the client on account of the quality.

On the other hand a project that fails on quality can never be taken as a success story if even it's delivered on time and within budget. This implies that quality is synonymous with customer needs that if not met then the project is a failure.

2.7.4 Stakeholder Satisfaction

Although first three elements of success criteria reviewed so far are considered as internal or primary criteria and stakeholder satisfaction termed as external or secondary criteria to project management, it is the latter which is most important and achieving it is a priority throughout all stages of a project right from conceptual to completion (Thi & Swierczek, 2010; Tukel & Rom, 2001).

The customer is the key stakeholder as he owns the project and provides the resources to actualize it implying that failure to manage his expectation can lead to stoppage of the project (Lim *et al*, 2005). Therefore his needs have to not only be well captured and the deliverables spelt out in the Project Requirements Definition but achievement of the same have to be prioritized throughout .This is so because customer satisfaction is synonymous with project success (Kerzer, 2003). As long as the customer/users are satisfied, the project is considered successful (Thia & Swierczek, 2010). It then follows that if a client's desire is to complete part of the building and move in as he sources for finances for the remaining construction works, then the project will definitely be a failure if that desire is not met regardless of success on account of time and budget.

There are other stakeholders in a project like consultants, subcontractors, financiers, employees, local authority etc. (Newcombe, 2003). Depending on the type of project, the expectations of each stakeholder must be identified and managed accordingly for the project to be considered a success (PMI, 2000).

2.8.0 Project Success Factors

2.8.1 Project Planning

Project planning is a very critical stage during the project life cycle, since if planning is faulty; a proper execution following the approved plan will end with a faulty project (Globerson, 2006). Many studies have identified planning as one of the critical success factors in a project (Pinto and Slevin, 1989; Meredith and Mantel, 1995; Johnson *et al*, 2001; Prateapusanond, 2003). Thus, high-quality planning increases the chances that the project will be properly executed and completed.

Responsibility for planning lies with the project manager who must ensure that it is carried out properly, and to the complete satisfaction of all relevant stakeholders.

In the United States of America, a research done over a period of ten years on the causes of failure of large engineering projects showed that poor initial planning as the leading cause followed by lack of clear objectives and deliverables, lack of understanding of dependencies, inadequate resource allocation, poor risk analysis, poor change management, lack of "buy-in" from stakeholders and poor understanding of priorities (Lawrence *et al*, 2000). All these notably fall under the ten core sub processes of planning (Koskela & Howel, 2002). Still in America, it was found that to avoid change orders in public school construction, then a lot of effort should go to scope definition (Gunham *et al*, 20007). Scope definition is another of the ten core sub processes of planning and its output is the Work Breakdown Structure (WBS).

In Libya's city of Benghazi, a study revealed that improper planning was the leading cause of delay of public projects (Tumi *et al*, 2009). It further found out that risk

management followed by proper planning were the main factors that would significantly reduce construction delays.

In Kenya, a study of construction delays of high rise buildings in Nairobi found out that one of the factors was poor project management practices more specifically in planning & control, estimating and risk estimation & management (Talukhaba, 1999). On implementation of public building projects, delays in construction was found to be rampant due to mainly poor planning & control, slow decision making by project participants, size & complexity of projects, funding procedures among others (Mbatha , 1986).

Participants in construction industry should therefore be trained on appropriate managerial skills in particular planning, scheduling and control to mitigate against delays in the industry (Kivaa, 2000).

In fact project management is about planning the work and then working the plan. Further, the tracking process is essentially planning, namely replanning (Devaux, 1999).

2.8.2 Information

As has already been found out, slow decision making is one of the factors that causes delay in construction (Tumi *et al,* 2009; Khang'ati, 1986). Decisions like whether to procure for the entire project in case of insufficient funds, change in specifications due to increase in prices of materials, approvals of change orders among others. The delays usually have cost implications and in fact it has been noted that a lot of resources are allocated in dealing with problems related to incomplete information, poor planning and an inappropriate procurement route (Ojiako *et al,* 2007). For effective control by the project manager then, there must be timely and accurate project information flow in all stages of management process as this facilitates informed decisions.

Initiation stage in project management process is the time in the project's life history when the foundations for success or failure are laid (Lock, 2007). Here the project manager captures in detail the requirements and scope among other items of the proposed project (Lock, 2007). Failure to do this may result in delivering a product the customer does not want and which fails to meet his objectives (Shen *et al*, 2004). Further, it may occasion multiple design alterations during the project construction process leading to additional costs and frustrations among project participants.

The output for this initiation stage is the Project Requirements Definition document. A well written Project Requirements Definition clearly spellsout what the project is all about and is the authoritative reference document that defines the project (Helman, 2002). The Project Requirements Definition describes the project in terms of scope, cost, time and quality. Project finances, resources, constraints to the project such as limited resources, acceptance criteria which could as well be the project success criteria and the stakeholders that include the client and the consultants are other factors that must be considered in this document (table 2.1).

Table 2.1: Project Requirements Defination

Topic	Description
Authorization	Reference to project authorization that selected and authorized project
Stakeholders	Corporate sponsors, customers, third parties impacted, project team
Deliverables	Products/services the project will deliver
Scope of work	Work to be done to deliver the products, services (high level summary)
Cost estimate	Initial order of magnitude estimate of the project budget
Schedule milestones	Initial project schedule in terms of key project milestones
Finance	Project financial requirements and source of funding
Risks	Treats to the project (e.g. adverse environment factors)
Resources	Resources needed to accomplish the project
Constraints	Constraints such as limited resources/funding, sites available, etc.
Acceptance criteria	What determines acceptable products/services and their approval

(source: Helman, 2002)

Public schools and universities in United States of America that clearly define their construction projects early on will have greater success staying within budget which implies that project requirements definition helps form a basis from which all cost decisions can be weighed (Laudoff, 2001). Planning is informed by the Project Requirements Definition document and therefore if it is faulty then the project plans likewise will be faulty. To gather with the other two core processes of project management, the three forms a closed loop (figure 2.3).

To underscore the importance of information, planning processes provide a plan, that is executed by the executing processes and variances from the baseline or requests for change lead to corrections in execution or changes in further plans (Koskela & Howel, 2007). That arrangement is made possible by the flow of information.

These requirements to gather with cost, time and quality forms the benchmark upon which success of the project will be measured and therefore they should be well captured, analyzed as well as managed. Most importantly, the requirements, which is "thewhat" should not only be agreed upon but also progressively reviewed by all parties (Wateridge, 1995).

2.8.3 Contract Documents

Designs are the ones that give the technical specifications of any building construction project (Ojioko *et al,* 2007). They are based on the requirements and needs of the client as captured in the Project Requirements Definition implying that if the latter does not mirror the client's objectives fully then his expectations will be partially met (Thyssen *et al,* 2010).

Incidences of cost and time overruns occasioned by rework are mainly due to errors in design and bill of quantities (Love *et al,* 2000). In public school construction in America, one of the three reasons for change orders was found to be adjustment of designs as the omissions in them made it impossible to actualize the constructions (Gunhan *et al*, 2007).

Also in Nairobi—Kenya, variations in designs was identified as a major cause of delay in construction of buildings (Kivaa, 2000). However, variations in designs can lead to scope reduction which is desirable but other times it leads to cost overruns as some of the features proposed may not be in the initial agreement therefore one should exercise a lot of care to avoid this scenario by undertaking design reviews and verifications (Love *et al,* 2000; Amusan, 2008). Furthermore, errors in designs and BQs are sources of disputes with resultant stoppage of the works.

2.8.4 Procurement and Resources

Project procurement has been described as an organized method or process and procedure for clients to obtain or acquire construction products. Apart from the traditional approach (design-bid-build), there are now other "fast-tracking" or innovative procurement systems used by the construction industry worldwide such as design-build and construction project management.

The different procurement systems differ from each other in term of allocation of responsibilities, activities sequencing, process and procedure and organizational approach in project delivery. These differences have invariably affected the project performance (Rosli *et al*, 2006).

In the traditional method, completion of project plans gives way to project execution and therefore this call for procurement of the contractor and sub-contractors to undertake the building construction. However, it is imperative to ensure availability of resources beforehand as a lot of projects have been known to delay or even stall due to financial problems (Talukhaba, 1999; Kivaa, 2000; Tumi *et al*, 2009). As a mitigation measure, the Public Procurement Oversight Authority Act of the Kenya government has instructed all procuring entities to ensure availability of funds for any construction project they are undertaking before committing the latter (Republic of Kenya, 2005; Republic of Kenya, 2015).

One should therefore ensure the appropriate procurement route for a building construction project is followed to guard against loss of resources due to problems that may arise (Ojioko *et al*, 2007).

Based on the resources available therefore, one may consider implementing construction of a building as a program and correspondingly break it into several projects.

2.8.5 Leadership & Team

A project is a carefully planned and organized effort to achieve a one-time task. It is conceived and completed by people who are involved in the whole process of project execution and completion. Thus, project management not only requires an efficient project manager but also a qualified leader who can lead the team effectively (Riyue, 2008). Qualification of the leader is of paramount importance because the task calls for the application of knowledge, skills, tools and techniques to project activities to meet project requirements (PMI, 2000).

The building construction industry involves complex technical knowledge and construction processes which render most of the clients to play a passive role in implementation of their projects (Shirazi & Hampson, 1999). This therefore requires both the leader and team implementing the project on behalf of their client to be experts in this respect as their role is central.

2.9 Strategic Plan

As evidenced by the many occupied incomplete residential buildings, a number of people commence house building constructions without sufficient funds to achieve practical completion and therefore this calls for one to have a strategic plan written or unwritten (see fig. 2.1 & 2.2). Strategic planning entails formulating implementation plans/strategies aimed at accomplishing long term objectives by taking into consideration the environment as well as the resources available (Ugboro, 2011). For the prospective house owner, the long term primary objective is to better his wellbeing by constructing a house to live in and since the budget is more than the available resources, then one has to come up with plans on how to achieve the set objective over a period of time. For purposes of this study, these plans will be referred to as house completion strategy/plan.

There are three strategies one may consider depending on the funds available as well as the factor pushing one to construct own house. These are: i) construct

progressively while occupying the incomplete house, (ii) construct to completion then move in regardless of the length of time and lastly (iii) employ cost reduction measures. The cost reduction measure one employs will depend on the first two strategies.

To understand the various cost reduction measures available to prospective house owners, relevant literature is reviewed next.

2.9.1 Cost Reduction Measures

To be successful in having over budget projects awarded, the building contractor has had to take a proactive role in working with owners and design teams to reduce project cost to amounts that owners are able to award. This cost reduction is normally accomplished through the following: value engineering, scope reduction, deferral of scope items until a later date (Waddle, 2008). Lean construction is another cost reduction measure by virtue of its ability to reduce wastes in construction (Alshayeb, 2011).

Value engineering (VE) has been defined as a systematic method to improve the value of goods and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost (Waddle, 2008). This involves identifying unnecessary costs in design and construction and/or proposing alternative design technologies to reduce cost without sacrificing quality or the intended performance requirements. Typically this process occurs at the conclusion of each stage of design, and new pertinent information is available for analysis (Law, 2004).

Overtime VE has transformed from a process used for preserving limited resources, into a dynamic approach that has demonstrate (an) ability to reduce project cost, improve quality and productivity, foster innovation, and eliminate unnecessary and costly design elements (Borkenhagen, 1999). In cases where estimates exceed the budget, value engineering provides an avenue for finding cost reduction opportunities (Laudoff, 2001) without affecting the project's size and program.

Further, the method is a valuable tool in satisfying the owner's needs and ensuring money is wisely spent (Seidel *et al*, 2012).

Over a five year period from 1993 to 1998 Florida's Department of Transportation (DOT) program accomplished over 320 VE studies, and accumulated more than $100million in savings each year (Borkenhagen, 1999). During that same time period, California DOT saved over $400 million by completing more than 200 VE studies (Borkenhagen, 1999). In fiscal year 1998 alone, 421 VE studies were done on state highway and transportation projects across the United States which resulted in 735 approved alternatives and $750 million of savings (Borkenhagen, 1999).

Another project in Miami, Ritz Calton, got completed after receiving a VE makeover in which $700,000 was saved through modification of materials for faster installation and the substituting of equipment. Notably, the project had delayed for more than a year after construction started due to lack of funds (Seidel *et al*, 2012).The results of VE are so exceptional that the use of the VE process has been federally mandated on some projects (Ware *et al*, 2012).

Scope reduction involves identifying areas of the project scope of work that can be reduced in quality, quantity, or both in a manner that is acceptable to the owner. Scope reduction items of work often consist of material or equipment substitutions that lower the cost of the project, but may not be an equal substitute (Waddle, 2008).

The other method of cost reduction is scope deferral which involves identifying areas of the project that can be delayed for future completion. This also includes considering what specific building elements that would need to be installed during the initial construction to facilitate future completion. An example of this would be installing structural framing for future installation of retractable partitions (Waddle, 2008).

The last cost reduction method is the application of lean construction principles which will definitely lead to improved productivity and reduction in wastes (Alshayeb, 2011). Lean construction principles are: concentrating on supporting the

customer purpose, designing process to maximize value and to reduce waste at the project delivery level, improving the total project performance is more important than reducing the cost or increasing the speed of any activity, and making sure that the performance of the planning and control systems can be measured and are improved (Lean Construction Institute, 2012). They are based on the objectives of lean production system which are maximizing value of product and minimizing waste (Soto, 2007).

It should be noted that construction waste account for a significant amount of construction cost. A study done in Brazilian construction industry showed that 20% - 30% of the purchased materials are not used and end up as wasted (Alshayeb, 2011).

In the United States of America the construction industry produces 135 million tons of waste annually making it the largest source of waste (Alshayeb, 2011).

Construction waste is also in time wasting encountered in stoppages, clarifications, variations in information, rework – all associated with design – and interaction between various specialists based on the contractual relationships (Soto, 2007). Waste reduction therefore implies reduction in the cost of construction.

2.10 Theoretical Framework

Theoretical framework of this study is therefore grounded on the following; utility, project success criteria, success factors of a project, factors that influences commencement of a project albeit on insufficient funds, building construction methods and lastly cost reduction principles.

2.11 Conceptual Framework

Literature review identified several variables key to early achievement of utility. These variables are all nominal and can be grouped into three categories; independent, intermediate and dependent variables. The independent variables are;-

1) Completion strategy: since one is starting the construction with insufficient funds to achieve practical completion, it implies one must have a strategy on how to complete the house and this will have a bearing on when utility will be achieved.
2) Construction method: this signifies use of consultants (project manager, architect, quantity surveyor and engineers) and the type of building construction contract.
3) Pushing factors: these are the factors that influence individuals to start house construction with insufficient funds to complete the project.
4) Cost reduction measures: since the funds are below the total construction budget, cost reduction measures are necessary if one is to achieve early utility of the house.

The intermediate variable is completion level whilst the dependent variable is satisfaction (utility). The conceptual framework is therefore as in figure 2.6 below.

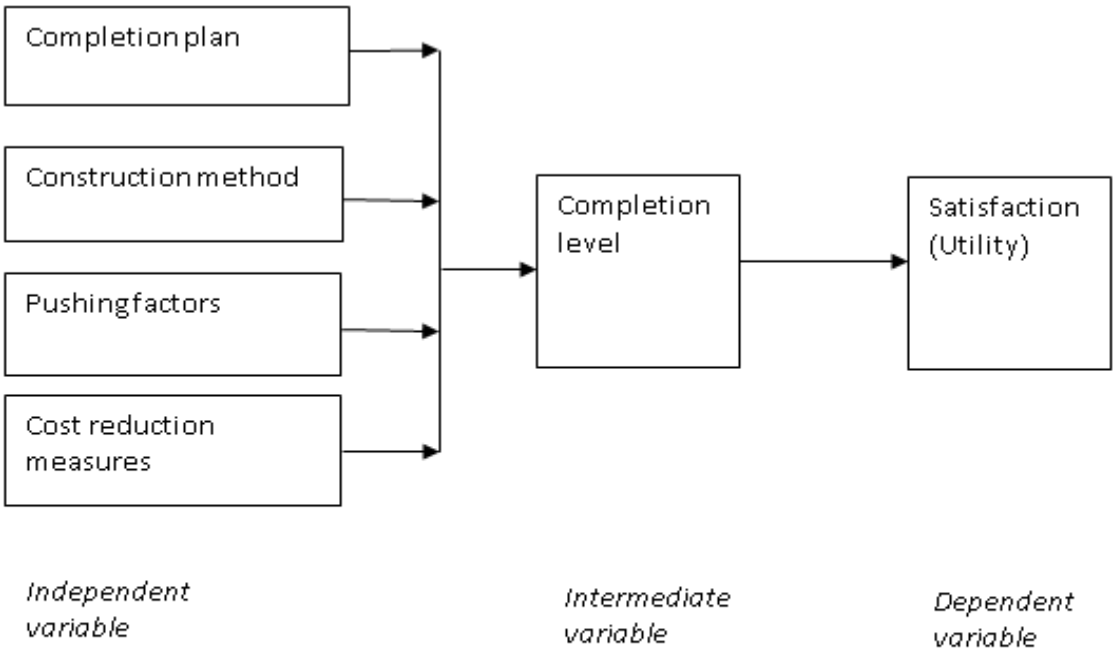

Figure 2.6: Conceptual Framework

(Source: Author, 2013)

2.12 Summary: Research Gap

Literature reviewed has revealed that quite a number of studies have been done on the causes of delay or stalling of projects across the world including here in Kenya. In all of them financial problems were identified as one of the major causes.

Financial problems are in different categories and one of them is starting with insufficient funds to achieve practical completion of a project. The review identified a number of factors that contributes to this scenario among them being high rents. This particular factor would imply that early achievement of utility would be of utmost importance to the prospective house owner and therefore success of the project will highly depend on it.

Further, extensive studies have been carried out over the years by different experts on project success. Specifically, areas covered are the relationship between project

management and success of a project, and success criteria and success factors. Literature on the importance of cost reduction methods in achievement of success in a project has also been reviewed.

Therefore the gap this study is going to bridge is the lack of an implementation method that ensures early achievement of utility in house building projects. This deficiency adversely affects project success.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Introduction

This research is geared towards determining the most appropriate method of implementing projects started on insufficient funding and in this regard the previous chapter on literature review looked at various aspects of project management in relation to achievement of success in a project. A number of factors were identified that impact on the implementation of projects. Therefore this chapter describes the research methodology used to study their influence in achievement of utility in a project and essentially encompasses the research design, research methods, sampling technique, participants and lastly data collection techniques, analysis and presentation.

3.2 Research Design

Since the research was on projects already implemented and therefore entailed obtaining data from their past non-manipulatable attributes, the research design that was considered most suitable was survey research. Surveys are concerned with describing, recording and interpreting conditions that either exist or existed (Kothari, 2007). There is simply no manipulation of a variable and rather the interest is more on relationships that exist or effects between variables (Kothari, 2007). Data from many cases, that is, house construction projects had to be collected in connection with several variables at a point in time (Bryman, 2004). These variables as identified in chapter 2 are; factors that leads one to start house construction on insufficient funds, project completion level, completion plan, project success factors and cost reduction methods.

3.3 Study Area: Civil Servants Housing Scheme Fund

The study narrowed down to projects financed under the Civil Servants Housing Scheme. The Civil Servants Housing Scheme Fund (CSHSF) was established in the year 2004 in line with the National Housing policy for Kenya, Sessional Paper No. 3 and the Kenya Vision 2030.One of its objectives was to provide loan facilities to civil servants for the purpose of constructing their own houses. This kicked off in 2008 and since then, about 100 civil servants country wide have benefited (Ministry of Housing, 2012).

The loans are given through Kenya Commercial Bank and Housing Finance Company of Kenya. The maximum repayment period is eighteen years at an interest rate of 5% per annum on monthly reducing balance. Overall, the scheme aims at motivating civil servants by improving their lifestyles through home ownership (Republic of Kenya, 2007). It therefore implies that if the houses are not completed successfully and are not ready for occupation, then the scheme will have failed.

3.4 Population, Sample and Sampling

The target population for this research was all projects undertaken starting with insufficient funds that could not achieve practical completion while the accessible population was the projects undertaken with insufficient funds in Nairobi under the Civil Servants Housing Scheme since the inception of the program in 2009.

A list of all projects undertaken in Nairobi was established from the overall list of all projects undertaken under the program. An evaluation of the projects which numbered 92 was carried out to identify those that had received insufficient funds and these formed the accessible population. This list was taken to be the sampling frame and it had 73 projects. Insufficiency of the funds was arrived at by considering the total of the house multiplied by the prevailing cost of construction per meter squared by the time of the construction.

Due to budgetary and time limitations, the research selected 30 number projects from the accessible population. Non-probability purposive sampling method was employed in stage one selection as it allows for cases with the required characteristics to be subjectively selected to make a representative sample (Mugenda & Mugenda, 2003). The specific technique employed was the quota sampling which entailed grouping the projects in terms of cadre of staff, size of project and location of project to ensure fair representation (Bryman, 2004; Kothari, 2007). Two quotas were established representing managers and the rest of the staff. In the main stream public service, managers are in job group "N" and above whereas below this you get the junior cadre who are the majority at about 75% (GoK). For this reason therefore, the quota for managers was allocated 10 numbers of projects and the remaining 20 went to the latter. Size and location of projects then informed selection of projects for each quota.

Stage two of the sampling employed convenient sampling method to mitigate against inaccessibility of the project owners and their consultants. Specifically snowball sampling technique was used whereby the researcher made contact with a small group of about 5 members from the sampling frame. Two of them were colleagues of the researcher in his place of work and the other three were suggested by the scheme managers. This group was then used to make contact with the remaining 25 public servants.

The participants of the research were the owners and their consultants who included architects and quantity surveyors, contractors and the financier.

3.5.0Data Collection Techniques

Four data collection techniques were employed and these are structured interview, observation, review of archival materials and photography.

3.5.1 Review of Archival Materials

The archival material was collected from the financier, owners of the houses, consultants and contractor. It was made of the following; project briefs, drawings, bills of quantities, contract agreements, minutes of site meetings, clerk of works reports, site instructions, letters of extension of contract period, change orders, default notices, letters of stoppage of works and occupation certificates.

The material was grouped together depending on the type, that is, all drawings, all bills of quantities before going through them systematically starting with project briefs all the way up to the occupation certificate following the various stages in a project life cycle. Each material was reviewed based on the field checklist and the information noted down.

3.5.2 Observations

The projects were visited on arrangement with the owners. Each building was inspected covering every part and the level of completion noted down. Also noted down was:

i) Buildings that had stalled
ii) The physical status of the various elements of the building; substructure, superstructure, roof, doors & windows and finishes
iii) The houses that had been occupied
iv) The materials used
v) The construction techniques

Drawings, specifications, site instructions and the works program were used in carrying out the inspection.

3.5.3Interviews

The interviews were done using structured questionnaires and the respondents were engaged in various ways as follows:

i) Owners; discussion was one on one guided by a questionnaire where the questions were put across to them and their responses recorded. This took place in their offices and others in their homes, for those who had occupied their incomplete houses

ii) Consultants; they were contacted through telephone and email to arrange for the interviews. For some the interviews were carried out in their offices in a one on one arrangement. Questions were read out to them from the questionnaire and their responses noted down. While the others interviews were done via telephone. The questionnaire was first sent to them via email then followed with telephone interview again going through all questions and recording their responses

iii) Contractors; meetings were arranged through the telephone and the interviews took place in their offices for some and in project sites for others. The same questionnaire was used and the same format followed for one on one interviews

iv) Financier; meetings were organized via telephone and discussions took place in their respective offices. The interview procedure was same as for the contractors

3.5.4 Photography

Photography was another method of data collection particularly in the area of documenting the physical status of the building projects. This was done systematically guided by a list prepared beforehand of all the photographs to be taken for each building project inspected. First to be taken were the pictures of the four views of each building followed by pictures of each building element. Each photograph taken was marked and the time recorded in the list for ease of identification and therefore a digital camera with a functional clock had to be used.

3.6 Research tools

Various tools were used in conducting the research. These are:

i. Camera – was used in collecting photographic data and physical status of the structure
ii. Questionnaires –assisted in the structured interviews and was administered either one on one or through the phone and/or email
iii. Telephone – some of the interviews were too busy and therefore this assisted in the administration of the questionnaires
iv. Computer/laptop – this tool was mainly for typing of work but also was used in administration of the questionnaires via email
v. Data sheets – used for recording data in the field
vi. Stationery

3.7 Data Analysis and Presentation

The analysis of data was both qualitative and quantitative and as such the data is presented in narrative form as well as tables, graphs and charts. The variables of the research were mainly nominal and therefore presentation of data was done using diagrams like bar charts and pie charts as they are easy to interpret and understand. The independent variables are; completion plan, construction method, pushing factors and cost reduction methods. Intermediate variable is the completion level while the dependent variable is satisfaction/utility. Foe correlations, the other method used to analyze and present data was contingency tables.

The key relationship the researcher set out to compute was between achievement of utility and the implementation methods so as to test the hypothesis. For the hypothesis to be true, then the significance level should be equal or less than 0.05.

Another independent variable was project success factors and the objective was to rate their level of influence in achievement of early utility in the study at hand. Relative Importance Index (RII) was the method used in rating these factors where the value ranges between 0 and 1. In this case, 0 would be the least important whereas 1 would the most important in influencing achievement of early utility.

The tables and diagrams were produced through the Statistical Package for Social Science (SPSS for Windows). This called for coding of the data for ease of in putting in the computer. This was achieved by use of closed-ended questions and assigning numerical values to the responses in the questionnaire. For the open ended question(s), the responses were first categorized and then values were assigned to each category (Mugenda & Mugenda, 2003).

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter deals with the presentation as well as analysis of the data that was collected from the field through the methods outlined in the previous chapter. It is arranged in a systemic manner so as to address the objectives set out in chapter one.

4.2 Respondents

This study targeted various people involved in construction project implementation for the sampled projects. Of the 30 participants, only 25 responded. The results in figure 4.1 indicate that of all the respondents in the study, 48% were clients followed closely 41% who were consultants. The other respondents were financiers and contactors.

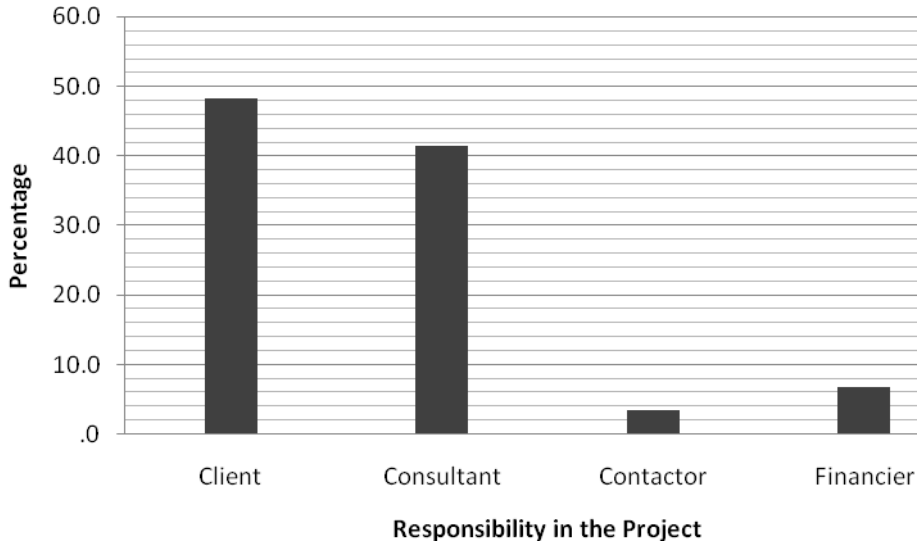

Figure 4.1: Respondent's responsibility in the project (source: Author, 2015)

4.3 Identification of Implementation Methods of House Construction

The study set out to find out the implementation methods preferred by the people when building their houses. There are two main methods, namely; (i) engaging a building contractor in which case the prospective house owner mainly makes payment to the former who undertakes the actual construction and (ii) self-build where the prospective house owner undertakes the construction himself by engaging workers and supervising their work directly.

These workers include skilled and unskilled laborers like masons & carpenters and mates, watchmen & store men respectively. Additionally, in the second method, the owner directly procures construction materials and ensures security of the same.

The results in figure 4.2 show that in most of the projects at 82%, the implementation was undertaken by the owner with only 18% being done through the contractor.

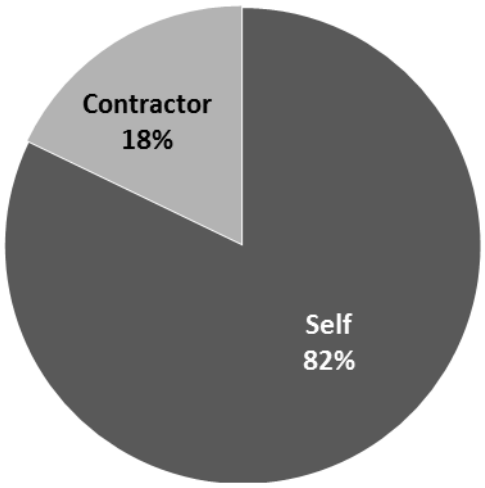

Figure 4.2: Construction Implementation Modality (source: Author, 2015)

The research went further to get an insight on the type of contract entered into for those projects that were implemented through a contractor. The results in figure 4.3 indicate that 93% of the implementation was through labor rather than full contract.

This implies that in total 99% of the house projects were undertaken through a labour kind of construction were the contractor plays no or minimal part in the house development.

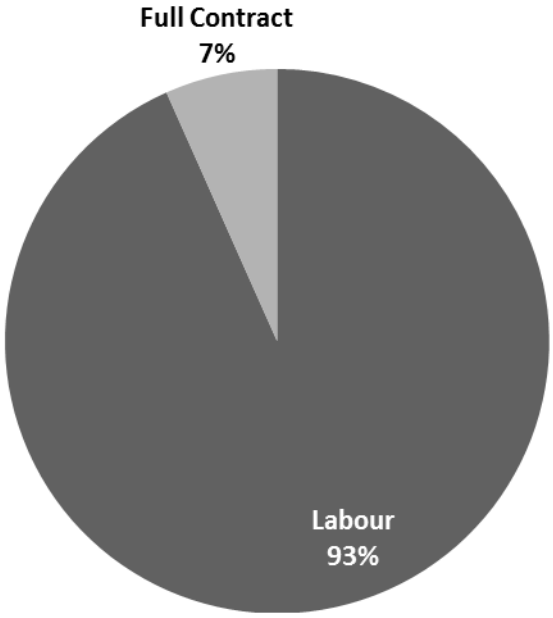

Figure 4.3: Type of Contract (source: Author, 2015)

As a follow up, the respondents were asked to mention what informed their choice of construction implementation in the previous section. The results indicate that 85% of the respondents' choice for the method of implementation was informed by cost as the major factor. Other factors mentioned to a small extent were time, professional advice and technical expertise.

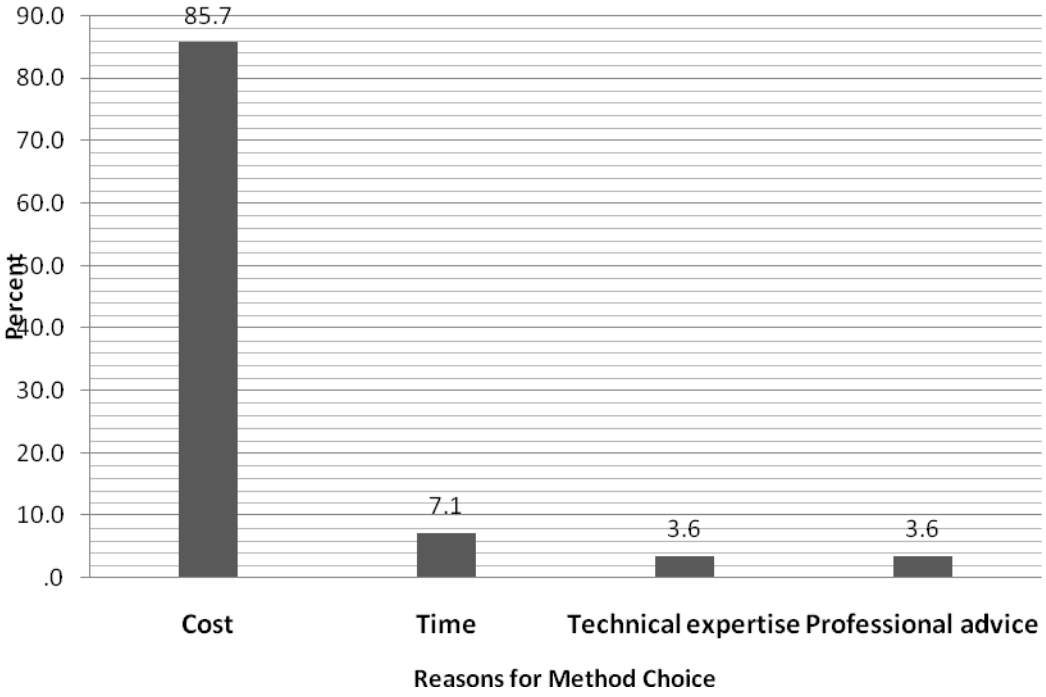

Figure 4.4: Reasons for the choice of construction method (source: Author, 2015)

The study sought to establish the stage at which building professionals are involved during the construction process. The result in figure 4.5 gives percentage rating of the stages where professionals are involved most. The result indicates that professionals are fully involved in all stages at 42%. Followed by designs and drawing stage where professionals are also involved as indicated by 39% of the respondents.

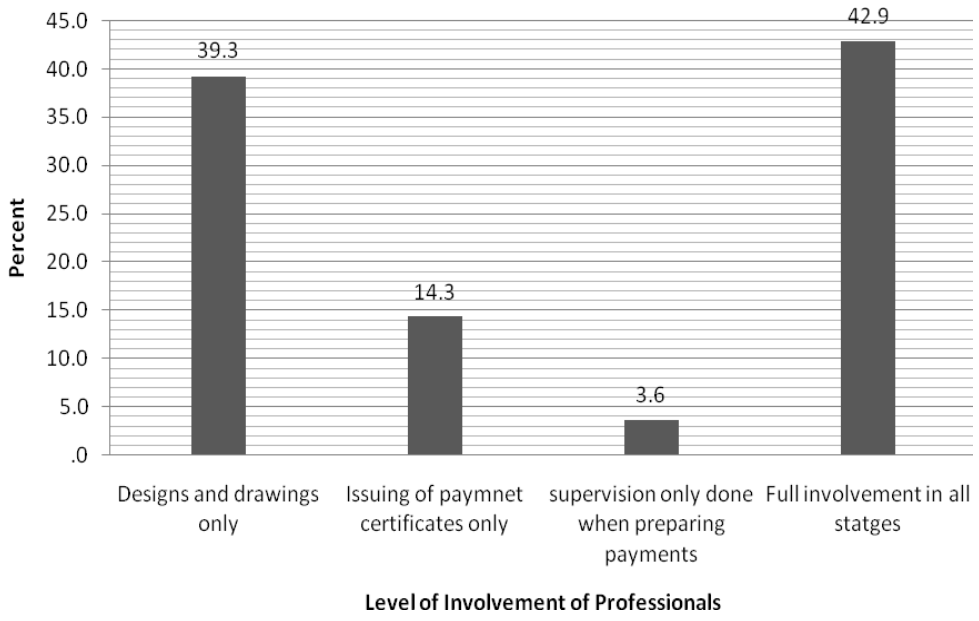

Figure 4.5:Level of involvement of Professionals (source: Author, 2015)

The results in figure 4.6 indicate that the construction implementers set targets. This was indicated by 96% of the respondents. The rest of the respondents however indicated that no target was set during the implementation of construction.

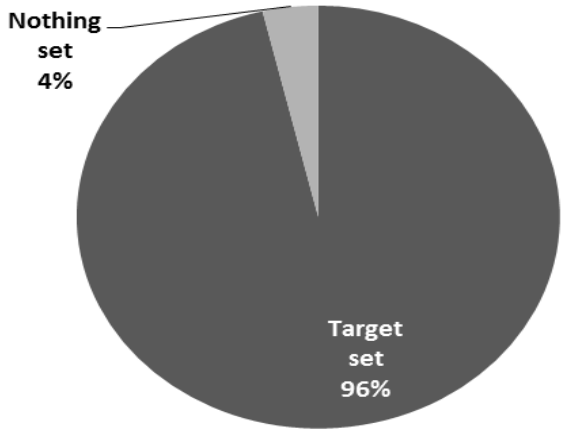

Figure 4.6: Any work targeted for completion (source: Author, 2015)

The respondents who had indicated that they set targets were asked to mention whether those targets were achieved ornot. The results in figure 4.7 indicate that 60%

of the respondents mentioned that the targets set were not achieved whereas 40% of them did not achieve the set targets.

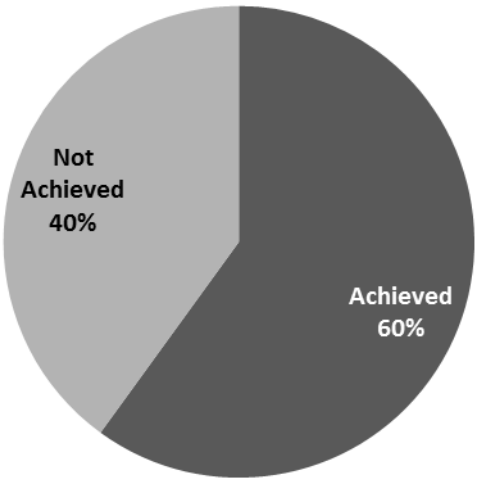

Figure 4.7: Achievement of set target (source: Author, 2015)

The respondents who had indicated non-achievement of construction targets were asked to state some of the reasons for non-achievement of the targets. the results in figure 4.8 indicate 89% of the respondents indicated that the main reason for not achieving the set target was management factor including planning, prices fluctuations, no use of cost reduction methods, procurement, scheduling and site conditions. The other reason indicated by 11% of the respondents was leadership and team factor such as the architect, quantity surveyor, structural engineer and service engineers.

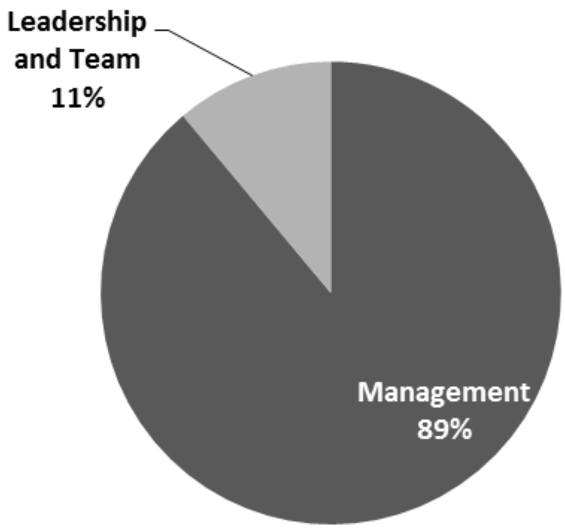

Figure 4.8: Reasons for not achieving target (source: Author, 2015)

4.4 Factors for Starting Construction with Insufficient Funds

The respondents were asked to state whether they knew that the loans disbursed for the construction could not complete the project. The results indicate that 78% of the respondents were aware that the funds could not complete the construction whereas 22% of them were not aware that the funds were insufficient to complete the construction. This is illustrated in figure 4.9.

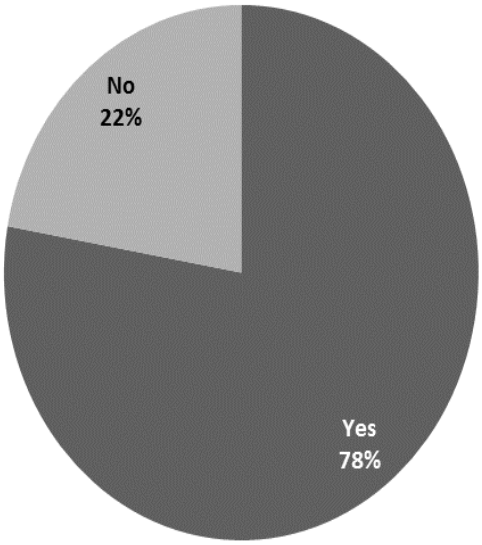

Figure 4.9: Awareness on funds insufficiency to complete construction (source: Author, 2015)

The respondents who had indicated that they knew that the funds given could not complete the construction were further asked to state what completion plan they had put in place when starting the construction. The results in figure4.10 indicate that 33% of the respondents had the plans to complete part of the construction and move into the building. Another 29% had planned to inject their own funds towards completion of the construction. The rest of the respondents indicated that they had planned to construct progressively.

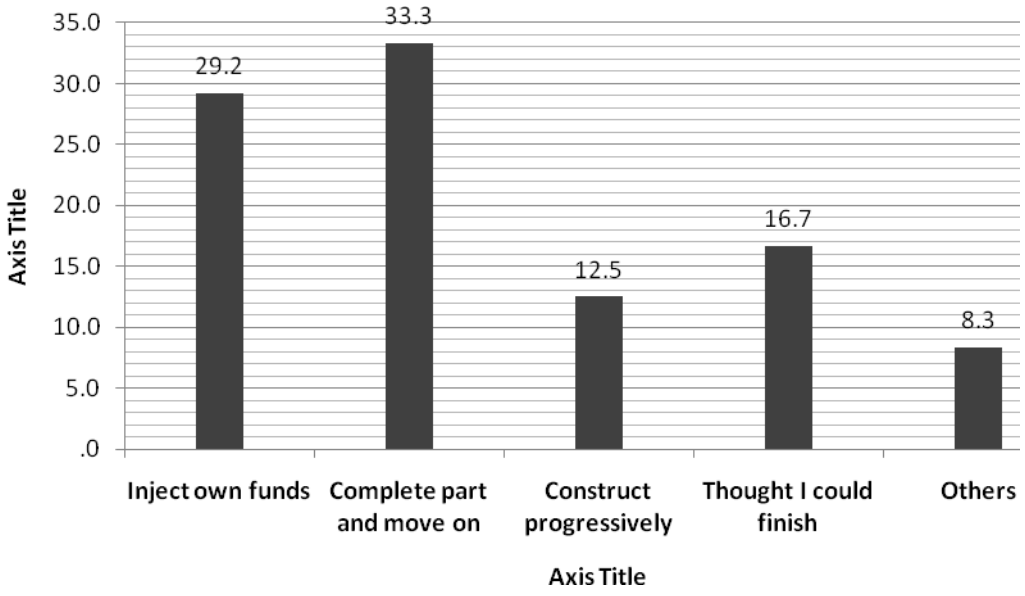

Figure 4.10: Completion plan when starting construction with insufficient funds (source: Author, 2015)

The study sought to establish the level of completion achieved in project implementation after exhaustion of the loan amount disbursed. The results in figure 4.11 illustrate that in general about 86% of the respondents had incomplete constructions which were either occupied at 39%, not occupied at 29%, or those that can be occupied but not occupied at 19%. This therefore implies that only 14% of the respondents had achieved full completion and had occupied their buildings after exhausting the loan amount.

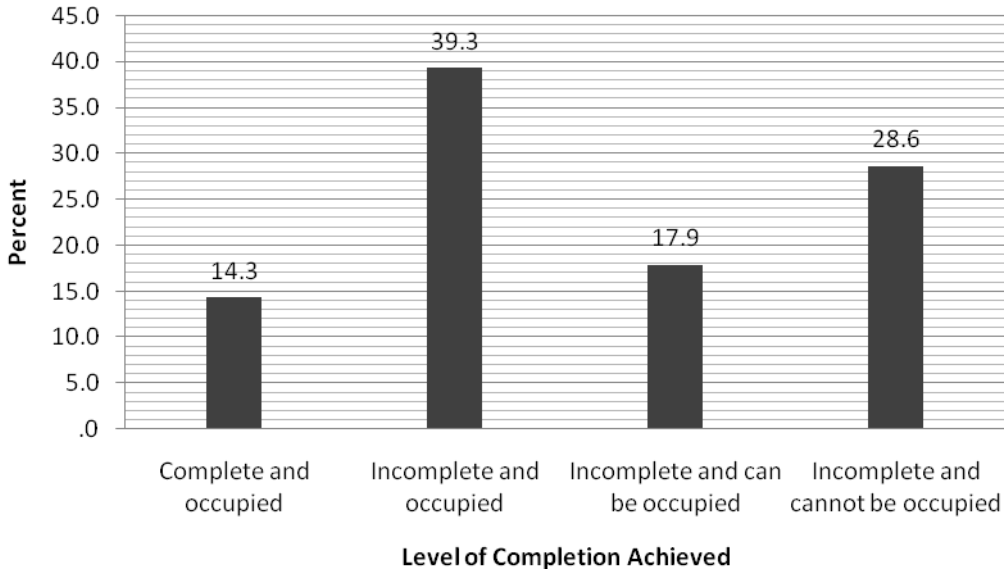

Figure 4.11: Level of project completion achieved at the end of loan (source: Author, 2015)

The respondents were asked to rate their satisfaction level with what had been achieved so far after exhausting the loan amount allocated for the construction. The results in figure 4.12 indicate that 43% of the respondents were well satisfied with the achievements whereas 14% were not satisfied at all with what was achieved.

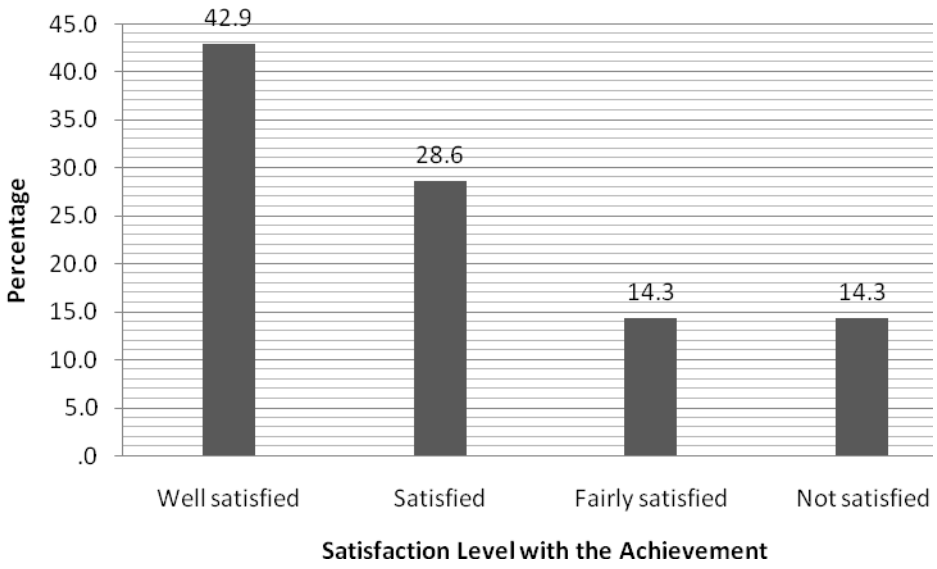

Figure 4.12: Level of satisfaction with the completion level achieved (source: Author, 2015)

This study also sought to establish the factors that pushed the respondents to start construction when they were aware that the loan amounts allocated to them would not be sufficient. The results in figure 4.13 show that one of the leading factors that pushed the respondents to start construction was high rents at 33%. The other factors were social status and ignorance.

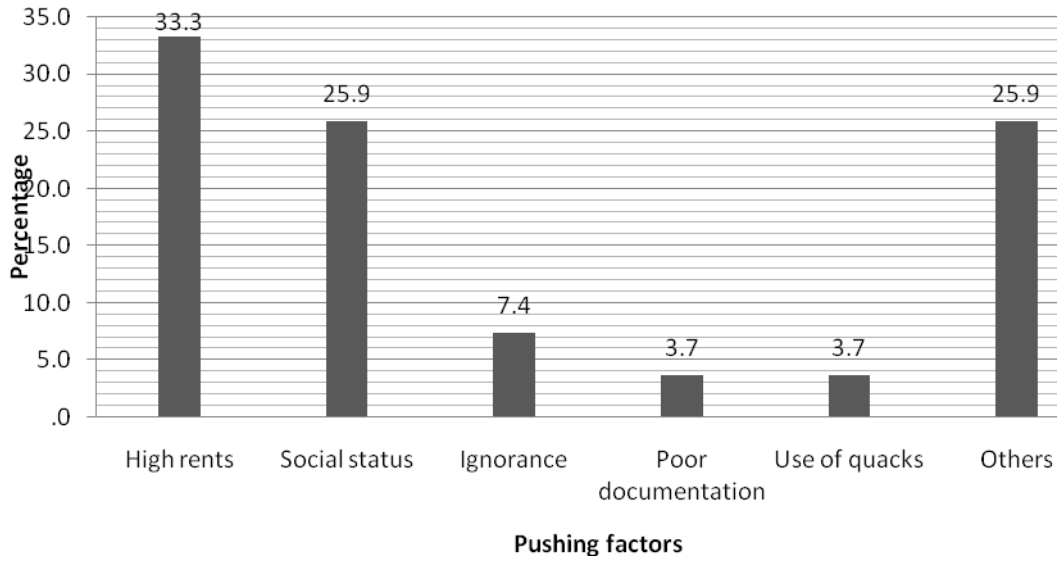

Figure 4.13: Factors that pushed respondent to start construction with insufficient funds (source: Author, 2015)

Further, the research sought to establish whether any cost reduction measures are considered by the project implementers during construction. The results displayed in figure 4.14 indicate that most projects implementers considered scope deferral at 67% as the most preferred cost reduction measure considered during construction. The least considered factor was lean production principles at 4%. The other cost reduction measure employed by the respondents was scope reduction which accounted for 7%.

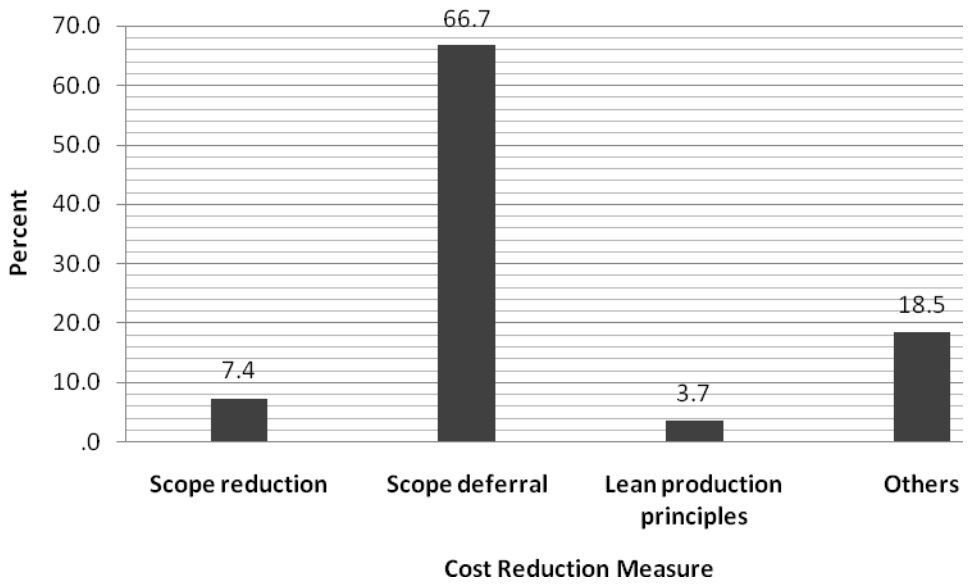

Figure 4.14: Cost reduction measures considered during construction (source: Author, 2015)

4.5 Correlations Analysis

This study sought out to know if there exists a relationship between some of the key variables in the study. To study the relationship, the study used contingency tables where a contingency coefficient was used to show the existence and magnitude of correlation between the variables.

The results displayed in table 4.1 indicate that there exist a relationship between existence of completion plan and the level of completion achieved. The relationship is positive as shown by a contingency coefficient value of 0.75 which is significant since the p-value is less than 0.005. The results also indicate that all the symmetric measures are significant hence affirming existence of a relationship between these two variables. Therefore completion plan applied by the building owners in construction influences the level of completion achieved in building project construction. For instance, the results indicate that if prospective house owners choose to complete part of the building and move in/occupy, then the level of completion achieved would be mostly an incomplete and occupied house. On the

other hand, if one plans to construct progressively, then results will most likely be an incomplete house that cannot be occupied, in other words utility will not be achieved in early stages.

Table 4.1: Contingency table showing the relationship between level of completion achieved and completion plan

			Completion plan				
			Inject own funds	Complete part and move on	Construct progressively	Thought I could finish	Others
Level of completion achieved	Complete and occupied	No.	0	1	0	0	1
		%	0	13	.0	.0	100
	Incomplete and occupied	No.	2	7	0	2	0
		%	29	88	0	50	0
	Incomplete and can be occupied	No.	3	0	0	1	0
		%	43	0	0	25	0
	Incomplete and cannot be occupied	No.	2	0	3	1	0
		%	29	0	100	25	0
Total		No.	7	8	3	4	1
		%	100	100	100	100	100
Symmetric Measures					Value	Approx. Sig.	
Nominal by Nominal		Phi			1.133	.003	
		Cramer's V			.654	.003	
		Contingency Coefficient			.750	.003	
N of Valid Cases					23		

(Source: Author, 2015)

The results in table 4.2 illustrate the existence of any significant relationship between level of completion achieved and satisfaction of the client. The contingency

coefficient of the relationship is 0.596 with a significance level of 0.239 hence it is concluded that a significant relationship doesn't exist between the two variables. This lack of significance could have been influenced by the small sample of respondents in the study.

Table 4.2: Contingency table showing the relationship between level of completion achieved and satisfaction

			Level of completion achieved			
			Complete and occupied	Incomplete and occupied	Incomplete and can be occupied	Incomplete and cannot be occupied
Level of Satisfaction	Well satisfied	No.	2	4	1	2
		%	100	50	33	25
	Satisfied	No.	0	3	2	1
		%	0	38	67	13
	Fairly satisfied	No.	0	1	0	2
		%	0	13	.0	25
	Not satisfied	No.	0	0	0	3
		%	0	0	0	38
Total		No.	2	8	3	8
		%	100	100	100	100
Symmetric Measures					Value	Approx. Sig
Nominal by Nominal		Phi			.742	.239
		Cramer's V			.429	.239
		Contingency Coefficient			.596	.239
N of Valid Cases					21	

(source: Author, 2015)

However, the cross tabulation numbers within the contingency table indicate that majority (5 out of 8) of those who were not satisfied did not achieve utility/habitability. Further, all those who achieved habitability were satisfied or well satisfied save for only one person. This one person did not achieve full completion and therefore this may be the cause of dissatisfaction.

The results displayed in table 4.3indicate that there is no significant relationship between factors that pushed the respondents to start construction with insufficient funds and level of engagement of owner. The contingency coefficient of the relationship is 0.439 with a significance level of 0.266 hence it is concluded that a significant relationship doesn't exist between the two variables. This lack of relationship is not surprising since the method of self-build is considered cheaper as the result of section 4.3 indicate and therefore being employees with limited resources all would like to save.

However, the cross tabulation numbers indicate that most people who chose to undertake construction themselves rather than use contractors were pushed by high rents and social status to start construction with insufficient funds.

Table 4.3: Contingency table showing the relationship between Level of engagement of owner in the implementation and factors that pushed owner to start construction with sufficient funds

			Factors that pushed you to start construction with insufficient funds				
			High rents	Social status	Ignorance	Poor documentation	Use of quacks
Level of engagement of owner	Self	No.	8	7	1	1	1
		%	89	100	50	100	100
	Contractor	No.	1	0	1	0	0
		%	11	0	50	0	0
Total		No.	9	7	2	1	1
		%	100	100	100	100	100
Symmetric Measures					Value	Approx. Sig.	
Nominal by Nominal		Phi			.488	.266	
		Cramer's V			.488	.266	
		Contingency Coefficient			.439	.266	
N of Valid Cases					27		

(source: Author, 2015)

The contingency coefficient results displayed in table 4.4 indicate that there is no significant relationship between levels of completion achieved and the cost reduction measures adopted in construction.

However, the cross tabulation figures indicate otherwise since: (i) all those who went for scope reduction achieved utility, (ii) majority of those whose chose scope deferral (13 out of 18) achieved utility, (iii) the one who adopted lean construction principles achieved utility and (iv) overall out of the 21 cases who employed cost reduction

measures, only 5 did not achieve utility. This therefore indicates a relationship between level of completion achieved and adoption of cost reduction measures.

Table 4.4: Contingency table showing the relationship between Level of completion achieved and cost reduction measures considered

			Level of completion achieved			
			Complete and occupied	Incomplete and occupied	Incomplete and can be occupied	Incomplete and cannot be occupied
Cost reduction measures considered	Scope reduction	No.	1	1	0	0
		%	33	10	.0	.0
	Scope deferral	No.	2	9	2	5
		%	67	90	50	63
	Lean production principles	No.	0	0	1	0
		%	.0	.0	25	.0
	Others	No.	0	0	1	3
		%	.0	.0	25	37
Total		No.	3	10	4	8
		%	100	100	100	100

Symmetric Measures		Value	Approx. Sig.
Nominal by Nominal	Phi	.751	.119
	Cramer's V	.433	.119
	Contingency Coefficient	.600	.119
N of Valid Cases		25	

(source: Author, 2015)

The study results indicate that a significant positive relationship exist between involvement of professionals in construction and achievement of targeted work. This is illustrated by a contingency coefficient of 0.493 and a significance level less than 0.045 in table 4.5.

Specifically, the cross-tabulation numbers indicate that a majority of project owners who achieved their targets had involved professionals fully in all stages of construction. Conversely, majority of those who did not achieve their target involved professionals the least in designs and drawing stage only. This therefore implies that the higher the involvement of professionals, the more likely one is to achieve target in building construction.

Table 4.5: Contingency table showing the relationship between involvement of professionals and Achievement of target

			Involvement of professionals			
			Designs and drawings only	Issuing of payment certificates only	supervision only done when preparing payments	Full involvement in all stages
Achievement of target	Achieved	No.	4	0	1	9
		%	36	.0	100	82
	Not Achieved	No.	7	2	0	2
		%	64	100	.0	18
Total		No.	11	2	1	11
		%	100	100	100	100
Symmetric Measures					Value	Approx. Sig.
Nominal by Nominal		Phi			.567	.045
		Cramer's V			.567	.045
		Contingency Coefficient			.493	.045
N of Valid Cases					25	

(source: Author, 2015)

The results displayed in table 4.6 indicate that there is no significant relationship between Involvement of professionals and level of completion achieved. The contingency coefficient of the relationship is 0.574 with a significance level of 0.154 hence it is concluded that a significant relationship doesn't exist between the two variables.

Table 4.6: Contingency table showing the relationship between Involvement of professionals and level of completion achieved

			Level of completion achieved				
			Complete and occupied	Incomplete and occupied	Incomplete and can be occupied	Incomplete and cannot be occupied	Total
Involvement of professionals	Designs and drawings only	No.	2	4	0	4	10
		%	20	40	0	40	100
	Issuing of payment certificates only	No.	2	0	3	0	5
		%	40	0	60	0	100
	supervision only done when preparing payments	No.	0	1	0	0	1
		%	0	100	0	0	100
	Full involvement in all stages	No.	1	4	3	3	11
		%	9	36	27	27	100
Total		No.	5	9	6	7	27
		%	19	33	22	26	100.0

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	0.700	0.152
	Cramer's V	0.404	0.152
	Contingency Coefficient	0.574	0.152
N of Valid Cases		27	

(source: Author, 2015)

Although, the cross-tabulation figures do not indicate a strong relationship between the two variables it is worth noting that: (i) out of the 11 cases who involved professionals fully, 7 were able to achieve utility and (ii) out of the 10 cases who did not involve professional fully, some got the funds to complete their constructions and

were not starting from scratch hence the achievement of utility. Further, the sample size had a bearing on this outcome.

The results displayed in table 4.7 indicate that there is no significant relationship between factors that pushed owner to start construction with insufficient funds and level of completion achieved. The contingency coefficient of the relationship is 0.608 with a significance level of 0.458 hence it is concluded that a significant relationship doesn't exist between the two variables.

Table 4.7: Contingency table showing the relationship between factors that pushed owner to start construction with insufficient funds and level of completion achieved

			Level of completion achieved				
			Complete and occupied	Incomplete and occupied	Incomplete and can be occupied	Incomplete and cannot be occupied	Total
What factors pushed you to start construction with insufficient funds?	High rents	No.	2	5	3	0	10
		%	20	50	30	0	100
	Social status	No.	0	2	0	2	4
		%	0	0	0	50	100
	Ignorance	No.	0	0	1	1	2
		%	0	0	50	50	100
	Poor documentation	No.	0	1	0	0	1
		%	0	100	0	0	100
	Use of quacks	No.	0	0	0	1	1
		%	0	0	0	100	100
	Others	No.	2	1	2	3	8
		%	25	13	25	38	100
Total		No.	4	9	6	7	26
		%	15	35	23	27	100

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	0.757	0.458
	Cramer's V	0.437	0.458
	Contingency Coefficient	0.604	0.458
N of Valid Cases		26	

(source: Author, 2015)

However, the cross-tabulation figures indicate that all (100%) those who were pushed to start construction by high rents were able to achieve utility. This group was more than the other groups followed by those pushed by social status at 50% i.e. in achievement of utility. This is understandable because if one is pushed by exorbitant rent or/and social status, then the quest to move out to one's house is high. Therefore there exist indeed a relationship between pushing factors and the level of completion achieved.

The results displayed in table 4.8 indicate that there is no significant relationship between factors that pushed owner to start construction with insufficient funds and owner's completion plan. The contingency coefficient of the relationship is 0.697 with a significance level of 0.304 hence it appears that a significant relationship doesn't exist between the two variables.

However, the cross-tabulation figures indicate that majority of the people who were pushed to start construction by high rents and social status had the plan to complete part of the construction and move into the building thus indicating some level of relationship between the two variables.

Table 4.8: Contingency table showing the relationship between factors that pushed owner to start construction with insufficient funds and owner's completion plan

			Completion plan				
			Inject own funds	Complete part and move on	Construct progressively	Thought I could finish	Others
What factors pushed you to start construction with insufficient funds?	High rents	No.	2	6	1	1	1
		%	18	55	9	9	9
	Social status	No.	0	2	1	0	0
		%	0	67	33	0	0
	Ignorance	No.	0	0	0	1	0
		%	0	0	0	100	0
	Poor documentation	No.	1	0	0	0	0
		%	100	0	0	0	0
	Use of quacks	No.	1	0	0	0	0
		%	100	0	0	0	0
	Others	No.	2	0	2	1	2
		%	29	0	29	14	29
Total		No.	6	8	4	3	3
		%	25	33	17	13	13
Symmetric Measures							
					Value	Approx. Sig.	
Nominal by Nominal		Phi			0.973	0.304	
		Cramer's V			0.486	0.304	
		Contingency Coefficient			0.697	0.304	
N of Valid Cases					24		

(source: Author, 2015)

The results displayed in table 4.9 indicate that there is no significant relationship between factors that pushed owner to start construction with insufficient funds and Cost reduction measures considered. The contingency coefficient of the relationship is 0.628 with a significance level of 0.178 hence it is concluded that a significant relationship doesn't exist between the two variables. However, the cross-tabulation results indicate that most of those who were pushed to start construction because of

high rents and social status (12 out of 16) preferred scope deferral as a cost reduction measure.

Table 4.9: Contingency table showing the relationship between factors that pushed owner to start construction with insufficient funds and Cost reduction measures considered

			What factors pushed you to start construction with sufficient funds?					
			High rents	Social status	Ignorance	Use of quacks	Others	Total
What cost reduction measures did you consider	Scope reduction	No.	0	1	0	0	1	2
		%	.0	14.3	.0	.0	16.7	8.0
	Scope deferral	No.	7	5	0	1	4	17
		%	77.8	71.4	.0	100.0	66.7	68.0
	Lean production principles	No.	0	0	1	0	0	1
		%	.0	.0	50.0	.0	.0	4.0
	Others	No.	2	1	1	0	1	5
		%	22.2	14.3	50.0	.0	16.7	20.0
Total		No.	9	7	2	1	6	25
		%	100.0	100.0	100.0	100.0	100.0	100.0

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.807	.178
	Cramer's V	.466	.178
	Contingency Coefficient	.628	.178
N of Valid Cases		25	

(source: Author, 2015)

The results displayed in table 4.5.10 indicate that there is no significant relationship between awareness on whether funds are sufficient and Cost reduction measures considered.The contingency coefficient of the relationship is 0.333 with a significance level of 0.448 hence it is concluded that a significant relationship doesn't exist between the two variables.

However, the cross tabulation numbers indicate that those who were aware that they had insufficient funds employed various cost reduction measure more than those who were not aware (17/20 compared with 2/4). Specifically, those who were aware employed scope deferral as the preferred cost reduction measure. Also out of the 4 who were not aware of the insufficiency of the funds, 2 likewise went for scope deferral on discovering that the funds could not complete the project.

Table 4.10: Contingency table showing the relationship between awareness on whether funds are sufficient and Cost reduction measures considered

			Cost reduction measures Considered				
			Scope reduction	Scope deferral	Lean production principles	Others	Total
Did you know that the fund could not complete the construction?	Yes	No.	1	15	1	3	20
		%	100.0	88.2	100.0	60.0	83.3
	No	No.	0	2	0	2	4
		%	.0	11.8	.0	40.0	16.7
Total		No.	1	17	1	5	24
		%	100.0%	100.0	100.0	100.0	100.0

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.333	.448
	Cramer's V	.333	.448
	Contingency Coefficient	.316	.448
N of Valid Cases		24	

(source: Author, 2015)

4.6 Project Success factors

This study sought to rate the importance of project success factors in achieving project utility when one starts with insufficient funds. The respondents were

expected to rate the factors on a scale of 1 to 5 with 1 being Not important and 5 being extremely important. The results have been weighted using the relative importance index and rank and the results presented in table 4.11.

The results displayed in the table show a ranking of the project success factors considered in achieving project utility for projects started with insufficient funds. The ranking is based on the relative importance index which takes any value between 0 and 1. The ranking starts with the extremely important factor to the least important factor. The study results indicate that project planning is extremely important project success in achieving project utility when the project is started with insufficient funds. This factor recorded the highest relative importance index of 0.9034.

The second category of project success factors considered as very important include cost reduction methods (0.8897), project brief (0.8414), project scheduling (0.8345) and setting of project success criteria (0.8345).

The third category of project success factor which are considered as important include information (0.7586), leadership and team (0.7517), risk management (0.7448), design and specification (0.7214), and procurement (0.7103).

The last category of projects success factors are those considered as least important in achieving utility are clear contract and bills of quantities and building regulations and by-laws.

Table 4.11: Project Success Factors in Achievement of Utility

Rank	Project Success Factors	Relative Importance Index
1	Project Planning	0.9034
2	Cost reduction methods	0.8897
3	Project brief	0.8414
4	Project scheduling	0.8345
5	Setting of project success criteria	0.8345
6	Information	0.7586
7	Leadership and team	0.7517
8	Risk management	0.7448
9	Design and specifications	0.7214
10	Procurement	0.7103
11	Clear contract and Bill of Quantity	0.6897
12	Building regulations and bylaws	0.6828

(source: Author, 2015)

The implication of this is that to achieve utility earliest for an insufficiently funded project, and then project planning must be carried out thoroughly and cost reduction strategy put in place. It is important to note that implementation or rather execution depends on the project plans which are outputs of the planning process. This planning process will encompass scope planning (brief development) & definition (designs and specifications), activity definition & sequencing (scheduling) and resource planning & allocation (budgeting). It is worth noting that setting of project success criteria is a subset of project brief which in turn is a subset of project planning. Also project scheduling which is a factor under category 2 according to the Relative Importance Index, is a subset of project planning.

It therefore follows that if project plans are properly produced the element of insufficiency of funds will have been captured not only in the project requirements definition (project brief) but also in resource planning and allocation. In fact, virtually all project plans should factor that aspect.

4.7 A Framework for Achieving Earliest Utility in House Building

The following findings have informed the formulation of the model by the researcher;-

1) Pushing factors influence the completion plan one adopts and by extension the level of completion achieved (see Table 4.7 & Table 4.8).
2) The pushing factors that recorded the highest numbers were; high rents and social status at 33.3% and 25.9% respectively (see fig. 4.13). Due to the pressure to move out to their own houses, most of them indicated their completion plan was to complete part and move in (see Table 4.5.8)
3) Setting of target influences the level of completion achieved (see Table 4.1)
4) More involvement of professionals influences achievement of set target (see Table 4.5).
5) Factors that most influences achievement of utility for project started on insufficient funds are: project planning, cost reduction methods, project brief, project scheduling and setting of project success criteria (see Table 4.11).

The model formulated comprises thirteen (13) steps starting with application for the loan to the issuance of partial occupation certificate and occupation of the partially completed house by the client (see fig. 4.15).

Of importance to note are the two innovations the model has put forward. These are:-

1. Finance guides design
2. Partial completion and occupation certificates to be issued by architect and town authority respectively.

4.7.1 Description of Stages in the Framework Model

The thirteen steps can be grouped into seven distinct (7) stages depending on the actors as can be seen from fig. 4.15.

Stage 1: This stage entails development of the project brief and the players are the client and the architect/ project manager. The brief should contain the following: project title, deliverables, scope of work, schedule milestones, amount of loan client qualifies for, client's budget, constraints and acceptance criteria (project success criteria). The output for this stage is the earliest utility brief and one can clearly see that for it to be completed then the client needs to know the amount of loan he qualifies for. This implies that: (1) application for the loan should be before any documentation, (2) the size of building designed should be dictated by amount of loan one qualifies for, (3) phasing of construction will strictly adhere to the budget. This stage covers steps 1, 2 and 3 of the framework.

The model comprises thirteen (13) steps starting with brief development to the issuance of occupation certificate for the partially completed house.

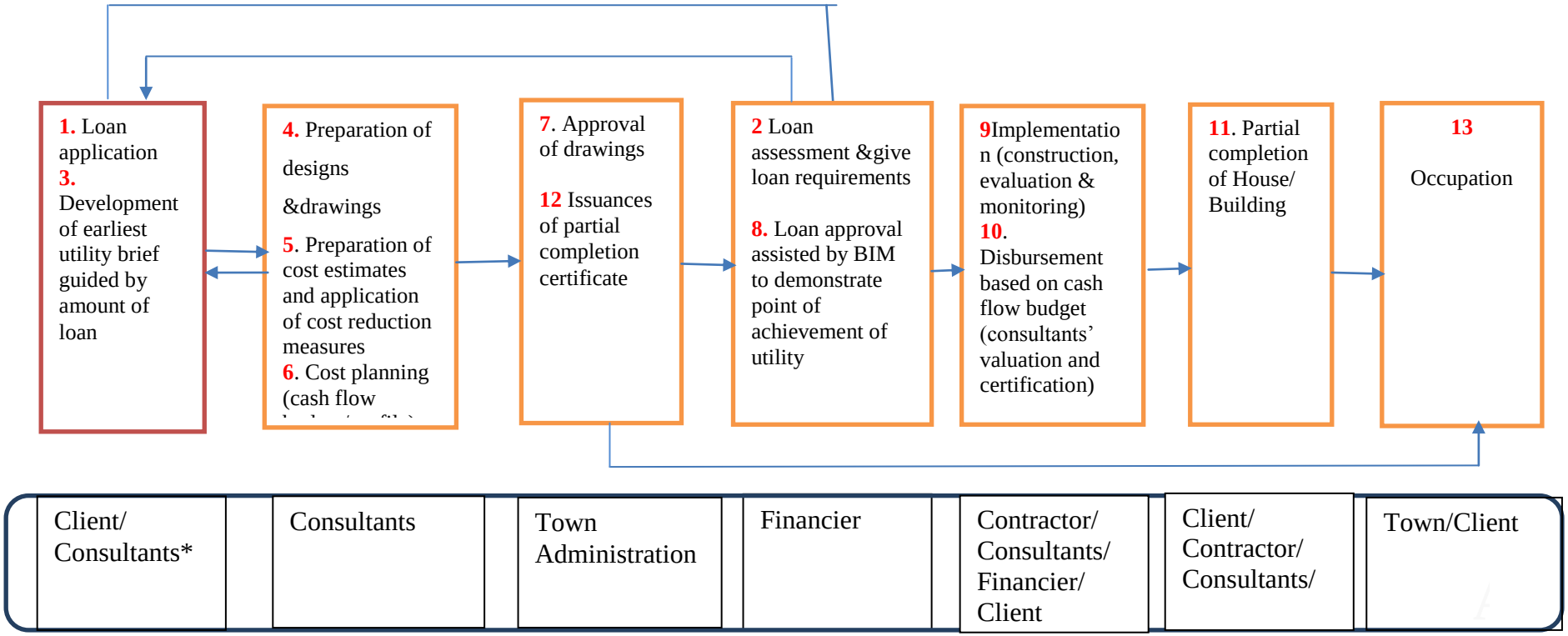

Figure 4.15 (source: Author, 2015) *Project Manager, Architect, Quantity Surveyor and Engineers

Stage 2: It entails production of the design(s) and drawings by the architect and engineers in close consultation with the client as well as the town authorities. Consultation with the latter is to ensure the design(s) meet its building bylaws and hence guard against redesign when seeking approvals latter. The design as well as size of the house will be guided by the amount of loan one qualifies for.

The design(s) is then costed by a Quantity Surveyor to give the estimated cost of constructing the same in step 2 of this stage. He goes further to undertake cost planning and produces cash flow and budget profiles. These two documents to gather with Work Breakdown Structure (WBS) are able to indicate the point at which utility is achieved.

To demonstrate this, the construction process is then simulated using BIM (Building Information Model) so that one is able to tell visually the point of achievement of utility. Depending on the amount loan the client qualifies for, then the consultants then subject the project to cost reduction measures to ensure achievement of utility at the earliest. The actors in this stage are primarily the consultants.

Stage 3: This is the stage when approvals from town administration are sought and since the architect had consulted with the administration during design, approval will most certainly be granted.

Stage 4: Once drawings have been approved, the client proceeds to submit his documents which include approved drawings, BQs, cashflow budget and the Work Breakdown Structure to the Financier (Civil Servant Housing Scheme) for loan approval. The financier must also subject the project to a simulation of the construction process also using BIM to confirm achievement of utility based on the loan the client qualifies for before approval of the same. Main actor here is the financier.

Stage 5: This is the construction implementation stage and involves many actors who include the client, consultants, contractor and the financier. Payment will be guided by the cash flow budget and upon certification by relevant consultants.

Stage 6: At the end of the last draw down of the loan, it is expected that utility will have been achieved. The architect will then issue partial completion certificate. For the client to occupy the incomplete house the town administration should grant an occupation certificate and since the bylaws currently do not allow that then there is a need to change them accordingly. The document to be issued by the town administration will then be called Partial Occupation Certificate and it should set the conditions for occupation to ensure safety. In any case quite a number of incomplete residential buildings are occupied across virtually all towns in the country and some of them cannot be said to be safe.

Stage 7: Occupation by the users.

This comes as a relief to the home owner as occupation usually removes the financial burden of paying rent.

Occupation of the incomplete houses has several advantages chief among these being checking against deterioration of the structure. This is a phenomena associated with incomplete structure that remain in that state for long. Vandalism is also common with incomplete structure especially if left unsecured.

It is therefore apparent that occupation of the incomplete house leads to saving on costs that the owner would have incurred if utility had not been achieved.

4.7.2 Explanation of Steps in the Stages

Step 1: Application for the house construction loan with the Civil Servant Housing Scheme.

Step 2: Assessment of the loan application by the CSHS and then give the loan requirements which should include the amount of loan one qualifies for.

Step 3: Development of early utility brief by the prospective house owner in conjunction with project architect. This will be guided by the requirements from the financier indicating loan amount. Project acceptance criteria will also be captured in this document.

Step 4: Preparation of designs and drawings by the architect and engineers. The designs should factor in the concept of early achievement of utility.

Step 5: Preparation of the BoQs by quantity surveyor.

Step 6: Cost planning will then follow and this will indicate the point at which utility will be achieved. The architect and quantity surveyor will then simulate the construction process using Building Information Model (BIM)to confirm and also demonstrate to the client the point of achievement of utility. Once satisfied, the client will give consent to submit the drawings for approval.

Step 7: Acquisition of building permit from town administration.

Step 8: Loan application to CSHS. Assessment of the loan application and approval of the same. Approval should be based on whether the amount to be given will achieve utility and this will be demonstrated by simulation of the construction process using BIM.

Step 9: Implementation stage which involves the client, contractor, consultants and financier.

Step 10: Disbursement of the funds based on consultants valuation and certification. Cash flow budget will be useful as a monitoring tool both for the client and financier.

Step 11: Partial completion of the house when the loan allocated is exhausted. At this point utility should have been achieved if the documents were right and the execution followed them. The architect will then issue a partial completion certificate.

Step 12: Acquisition of partial occupation certificate from town administration based on the partial completion certificate.

Step 13: Client takes over the partially completed house and start occupying it.

4.7.3 Comparison of Framework Model and Contemporary Practice

The following are the differences between the early utility framework model and the normal practice of house construction;-

Table 4.12; Framework Model and Normal practice

1. Normal Practices	**1. Framework Model**
2. Loan application done after one gets approval of drawings.	2. Loan application done before any documentation and the requirements communicated to the applicant.
3. Usually BOQ is tailored to march the loan amount one qualifies for	3. Approved design and BOQ are dictated by the loan amount
4. No simulation of construction before seeking approval of drawings to show achievement of utility with funds available	4. Simulation of construction of the house done before even approval of drawings is sought from town administration.
5. Brief does not usually set out achievement of early utility as a project success criteria	5. Achievement of early utility is well spelt out as a project success criteria
6. The building bylaws do not allow occupation of incomplete houses and therefore owners are not issued with occupation	6. Partial occupation certificates is one of the innovations this model has put forward. This calls for amendment of the

certificates implying that they occupy them illegally.

building bylaws.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter looks at the data presented and analyzed in Chapter 4 and summarizes the key findings as well as give a conclusion and draws recommendations. The chapter too outlines how this study contributes addition of knowledge and finally points out areas for further research.

This study had set out to develop a model framework for implementation of housing projects in such a way that the client may achieve utility earliest in the construction process of the house particularly for those started with insufficient funds to practically complete the house. To achieve this goal, the study outlined five specific objectives. The proceeding sections will highlight in summary the study findings in line with the specific objectives of the study.

5.2 Summary of Findings

5.2.1 The Implementation Methods Used in House Building

This study had sought to establish the implementation methods used in building construction. The findings established that most owners preferred to undertake construction of buildings themselves by engaging workers and supervising them directly. For those owners who opted to engaged contractors, they did so through labor contracts rather than full contracts. The choice of contract by owners was majorly informed by the cost considerations as shown by the findings of the study.

The study went further to find out to what level prospective owners involved professions during the construction process. The study findings indicate that even though professionals were involved in all stages during implementation, the involvement was highest at the design and drawings stage. During the construction

project implementation, most of the implementation team set targets which they hoped to meet. The set targets, as per the study findings, were in most circumstances achieved. Those who missed set targets according to the study findings indicated project management problems such as planning, price fluctuations, and non-usage. The other reasons as highlighted in the study findings included, procurement, scheduling and site conditions.

5.2.2 Factors for Starting Construction with Insufficient Funds

This study sought to find out the reason why prospective owners would start construction with insufficient funds. The findings established that a higher number of prospective house owners were well aware before stating construction that the funds given to them was not sufficient to complete the construction. The findings further indicate that most of those who were aware of insufficiency of the funds mostly planned to complete part of the construction and occupy the buildings as they look for other funds to fully complete the buildings. Others who are aware of funds insufficiencies had planned to inject own funds or construct progressively until they achieve full completion.

It was further established through the study findings that most of the prospective owners who initiated construction projects with insufficient funds did not achieve completion. However, a good number of the incomplete buildings were occupied. Only minimal number of owners were able complete their buildings and occupy them. Additionally, the study findings revealed that most of the construction projects owners were satisfied with the level of completion achieved implying that they had achieved their targets.

As regards the factors that push prospective owners to start construction with insufficient funds, the study findings revealed that the leading factors were high rents that they pay to landlords and the social status that force them to build their own houses. In addition, the study findings established that those who had started

construction with insufficient funds majorly resorted to scope deferral as a cost reduction measure to enable them achieve utility with insufficient funds.

5.2.3 Relationship between Pushing Factors and Implementation Methods

Determination of the correlation between the factors highlighted in the proceeding sections was another major area that this study focused on. For instance, on one hand the study sought to find out the relationship between level of completion and completion plan, level of satisfaction, cost reduction measures, involvement of professionals and pushing factors. On the other hand the study also sought to determine the relationship between pushing factors and level of owner engagement, completion plan, and cost reduction measures. Finally, the study was interested in determining the relationship between involvement of professionals and achievement of target on one hand and the relationship between cost reduction measures and awareness on funds insufficiency before project implementation.

The study findings established that there is a significant correlation between the level of completion achieved and completion plan. However, the study findings indicated that there is insignificant correlation between the level of completion achieved and level of satisfaction, cost reduction measures, involvement of professionals and the factors that pushed owner to start construction with insufficient funds. It was noted that the reason why most of the correlations were insignificant may have been due to the limited sample size of respondents who could give response. The study therefore alternatively considered the cross tabulation figure which in some instances indicated a relation between variables. For instance, the cross tabulation figures indicated that those who have had occupied their buildings whether complete or not were more satisfied also. Likewise according to the cross tabulation figures those who applied scope deferral as the preferred cost reduction measured achieved incomplete but occupied buildings. The study findings equally established that the owners who were pushed by factors such as high rents and social status were also self-engaged in construction of their buildings. Also, the findings further established that the owners pushed by high rents to start construction achieved incomplete buildings but

occupied them. The findings further indicate that those pushed by high rents had completion plan of completing part of the building and moving in. Finally, most of these owners achieved incomplete buildings but decided to occupy them altogether.

This study sought to determine how involvement of professionals influenced achievement of target. The findings established that the owners who decided to involve professionals at designs and drawings only did not achieve their targets. The findings also suggest that those who were aware that the funds they have could not complete the construction preferred scope deferral as the cost reduction measure.

5.2.4 Rating of Most Influential Project Success Factors

This study had equally sought to establish the most influential project success factors in achievement of utility at the earliest during construction implementation. The study findings indicate that the factors can be classified into two categories of most influential and least influential factors. The most important factors in achieving project utility when the project is started with insufficient funds include; project planning, cost reduction methods, project brief, project scheduling and setting of project success criteria.

On the other hand, the findings indicate that the less important factors include; information, leadership and team, risk management, design and specification, procurement clear contract and bill of quantity and building regulations and by-laws.

Finally, all the above findings were used to come up with a house building implementation model for projects started on insufficient funds in order to achieve utility at the earliest.

5.2.5 Framework Model

Important highlights of the model are;-

Stage one which entails development of earliest utility brief guided by the amount of loan one qualifies for. This implies that loan application precedes all other steps so that one gets to know the conditions and the amount of the loan.

Design enables early achievement of utility as set out in the brief and is dictated by amount of the loan. Discussions with town authority are done exhaustively at this stage to avoid changes when seeking approvals of the drawings.

Simulation of the construction process using BIM is done at the stage of preparation of cost estimate so that one can tell the point at which utility is achieved. The loan amount is the guiding principle and therefore cost reduction methods will be employed to ensure utility is achieved.

Loan approval will depend on achievement of utility with the loan granted and this will be demonstrated by simulation of the construction process.

Issuance of partial completion and occupation certificates by project architect and town administration respectively is key innovation of this model.

5.3 Conclusions on the Aim and Objectives

The aim of this study was to develop a model framework for implementation of housing projects in such a way that the client may achieve utility earliest in the construction process of the house particularly for those started on funds insufficient to practically complete the house. This aim was accomplished by meeting each of the objectives in the study as follows;-

5.3.1 Implementation Methods

It can also be concluded that that most of the prospective house owners preferred to implement the construction by themselves rather than involve contractors. The implementation was undertaken through labour contracts and the owner's choices were majorly informed by cost considerations. Therefore, prospective owners involved professionals in all stages during implementation though the involvement

was highest at the design and drawings stage. The level of involvement of professionals had a bearing on achievement of targets which in most circumstances was achieved.

5.3.2Factors for Starting Construction with Insufficient Funds

As regards the factors that pushed prospective owners to initiate construction projects with insufficient funds, it can be concluded that the leading factors that push prospective owners included high rents and social status.

5.3.3 Correlation between Pushing Factors and Implementation Methods

As regards establishing existence of correlation between the variables of the study it can be concluded that there was a significant correlation between the level of completion achieved and completion plan. However, there were insignificant correlation between the level of completion achieved and level of satisfaction, cost reduction measures, involvement of professionals and the factors that pushed owner to start construction with insufficient funds. Even though the correlation was insignificant in most instances, cross tabulation figures indicated existence of correlation between the variables.

5.3.4 Rating of Most Influential Project Success Factors

With regards to determination of most influential Project Success factors in achievement of utility at the earliest, it can be concluded that the most important factors in achieving project utility at the earliest when the project is started with insufficient funds include; project planning, cost reduction methods, project brief, project scheduling and setting of project success criteria.

5.3.5 Framework Model

The antidote for achievement of utility in house construction started on insufficient funding is the developed framework model because of the following benefits;-

1. It guarantees achievement of early utility.
2. Ameliorates financial stress as one is able to occupy the incomplete house.
3. Guards against deterioration of the incomplete house associated with unoccupied incomplete buildings and by so doing checks costs of restoration.

5.4Recommendations

The study set out to look at the problem of implementation methods which are not effective due to the fact that they do not lead to achievement of utility in house building projects undertaken using insufficient funds. A house building implementation model has been developed (fig. 4.7.1) which this study recommends as adoption of the same will guarantee achievement of utility. The effectiveness of the model lies in the fact that it was developed by taking on board project success criteria and the success factors (table, 4.6.1) applicable to house projects started with insufficient funds. Other recommendations arising from the findings are;-

1. Majority of prospective house owners are pushed by high rents & social status to start house construction with insufficient funds consequently most indicated that they planned to finish part of the house and move in with majority achieving that. Project managers/ architects should ensure that designs allow not only phased construction but also phase one guarantees utility of the house. Above all, town authorities should enact bylaws that allows for occupation of partially completed house/building (fig. 4.15). This implies that architect will be required to issue partial completion certificate.
2. Most of respondents who set targets achieved them and further majority of those were the ones that involved building professionals the most .Project manager/ architect should ensure that they assist in development of a brief that captures achievement of utility at the earliest as a target in the project acceptance criteria.
3. Project planning, cost reduction measures and setting of project success criteria are the most influential project success factors in early achievement of utility in house construction when starting with insufficient funds. After

production of project plans, project manager/architect to simulate the construction and check at what level utility is achieved then subject it to cost reduction measures based on client's budget before actual construction commences.

4. Project implementation framework model that guarantees early achievement of utility is necessary and was developed in 4.7.1.Financiers and prospective house owners should embrace and use this early utility building implementation framework model.

5.5 Areas for Further Study

In the process of this study, it was noted that the research problem can be addressed more thoroughly with a bigger sample size. An area for further study is therefore, a repeat of this study with a larger sample size and a random sample in order to refine the statistical results.

Additionally, the developed framework in this study can be tested on a number of actual housing projects in order to firm up the proposed process.

Lastly, utility as a function of cost is another area of further study using regression analysis.

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APPENDICES

Appendix 01; Research Permit

PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Jackson Mutua
of (Address) Jomo Kenyatta University of Agriculture and Technology
P.O.Box 6200-00200, Nairobi.
has been permitted to conduct research in

Location	District	Province
Machakos	*Eastern*	

on the topic: An investigation on how to achieve utility for inadequately funded projects: A case of Syokimau Estate in Mavoko Municipality, Kenya.

for a period ending: 30th June, 2013.

.....
Applicant's Signature

PAGE 3

Research Permit No. *NCST/RCD/14/012/1440*
Date of issue *19th October, 2012*
Fee received *KSH. 1,000*

.....
Secretary
National Council for Science &Technology

CONDITIONS

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed with-out prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2)/four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

GPK6055t3mt10/2011

(CONDITIONS–see back page)

Appendix 02; Questions to Guide a Structured Interview

This questionnaire is administered in a research entitled "an investigation on how to achieve utility for inadequately funded projects; a survey of privately funded house constructions under the Civil Servants Housing Scheme". The research work is part of requirements for the award of a degree of Master of Construction Project Management at Jomo Kenyatta University of Agriculture and Technology in the Department of Construction Management.

I do hereby declare that the information I will gather through this questionnaire will not be used for any other purpose other than the academic research mentioned above. Further to this, no personal information will be divulged to any other quarter whatsoever.

Your cooperation in filling it will be highly appreciated.

A. Project Background

i) Client (job group)……

ii) Location……

iii) Contract Sum……

iv) Contract Period……

V) Responsibility in the project

		Code
Client		1
Consultant		2
Contractor		3
Financier		4

B. Factors that lead to starting house building with insufficient funds

i) Did you know that the funds could not complete the construction

		Code
Yes		1
No		2

ii) If yes, then what completion plan did you have in starting the construction

		Code
Inject own funds		1
Complete part & move in		2
Construct progressively		3
Thought I could finish		4
Others		5

iii) What level of completion did you achieve at the end of the loan

		Code
Complete and occupied		1
Complete and not occupied		2
Incomplete and occupied		3
Incomplete and can be occupied		4
Incomplete cannot be occupied		5

iv) Were you satisfied with what you achieved?

		Code
Extremely satisfied		1
Well satisfied		2
Satisfied		3
Fairly satisfied		4
Not satisfied		5

iv) What factors pushed you to start construction with insufficient funds

		Code
High rents		1
Social status		2
Ignorance		3
Wrong cost estimate		4
Poor documentation		5
Use of quacks		6
Others		7

v) What cost reduction measures did you consider

		Code
Value Engineering		1
Scope reduction		2
Scope deferral		3
Lean production principles		4
Others		5

C) To describe the various methods used in house construction

i) Level of engagement of the owner in the implementation-; was the implementation undertaken by the owner directly or through contractor?

		Code
Self		1
Contractor		2

ii) If through contractor what was the type of contract

		Code
Labour		1
Full contract		2

iii) What reasons informed the choice of method

		Code
Cost		1
Time		2
Technical expertise		3
Professional advise		4
others		5

vi) Involvement of Professionals

Use of their names – with or without consent		1
Designs & drawings only		2
Issuing of payment certificates only		3
Supervision only done when preparing payments		4
Full involvement in all stages		5

vii) Any work targeted for completion

		Code
Target set		1
Nothing set		2

viii) Targeted work achieved or not

		Code
Achieved		1
Not achieved		2

ix) Reasons for not achieving set target

Management – planning, prices fluctuations, no use of cost reduction methods, procurement, scheduling, site conditions	1
Technical – designs & specification errors, poor estimation	2
Leadership & team - architect, quantity surveyor, structural engineer, service engineers	3
Contractors incompetence Disputes –	4
Others – scope creep, scarcity of supplies, inclement weather, accidents	5

C. Project Success Factors

Based on your experience, rate the importance of the following factors in achieving project utility when one starts with insufficient funds

Key

5 – Extremely important

4 – Very important

3 – Important

2 – Fairly important

1 – Not important

i. Project brief

5	4	3	2	1

ii. Project planning

5	4	3	2	1

iii. Information

5	4	3	2	1

iv. Leadership and team

5	4	3	2	1

v. Risk management

5	4	3	2	1

vi. Procurement

5	4	3	2	1

vii. Setting of project success criteria

5	4	3	2	1

viii. Clear contract and Bill of Quantity

5	4	3	2	1

ix. Design and specification

5	4	3	2	1

x. Cost reduction methods

5	4	3	2	1

xi. Project scheduling

5	4	3	2	1

xii. Building regulations & bylaws

5	4	3	2	1

D) What other factors would you consider important in implementation of house construction in order to achieve utility?

E) In your own words what steps/tools assisted in achievement of utility in the project?