VALUE MANAGEMENT:
A TOOL FOR COST MANAGEMENT IN THE BUILDING INDUSTRY IN KENYA

BY

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DECLARATION

DECLARATION BY THE CANDIDATE

This thesis is my original work and has not been presented for a degree in any other University. No part of this thesis may be reproduced without prior permission from the author and or University of Nairobi.

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DEDICATION

To my wife and children;

Wanjiru,

Wanjiku,

Muthoni,

Nderitu and

Wangeci Kiboi

for their love and support.

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ABSTRACT

This research project is an evaluation of the application of value management as a tool for cost management in the building industry in Kenya. The construction industry is a key sector of the economy. It involves large investments and developers would like to get value for their money. The problem of projects exceeding their life cycle economic budget depletes the returns on investments. Another problem is functional failure of a project to perform as intended. The research looked at value management as one way of improving cost performance. The research sought to establish the extent of application, awareness and the challenges of practicing value management in the building industry in Kenya. The research concentrated on architects and quantity surveyors in the private sector based in Nairobi. This is where most of the consultants are located and who handle projects all over the country (Githaiga, 2006). The study also interviewed the Ministry of Public Works to seek policy position regarding application of value management by the government. Data was analysed using Statistical Package for Social Sciences.

The findings of the study are that the level of application of structured value management is low. Various challenges were identified which include, lack of policy by the government, lack of legal framework, low level of awareness, lack of interest, and lack of effective demand among other reasons. The study however found that there are aspects of value engineering which are carried out though without identifying it as value engineering or management. The study recommends that the consultants in the building industry be sensitized and encouraged to embrace value management through Continuous Professional Development, workshops and seminars. Developers must also be sensitized about importance and benefits of value management through their trade and welfare associations. Another way is to encourage practice of value management through policy guidelines for public buildings and construction projects. This has been one way of promoting its practice in other countries.

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ABBREVIATIONS AND ACRONYMS

BORAQS	-	Board of Registration of Architects and Quantity Surveyors
CAP 525	-	Chapter 525 Laws of Kenya, Architects and Quantity Surveyors Act
GDP	-	Gross Domestic Product
IQSK	-	Institute of Quantity Surveyors of Kenya
MAAK	-	Member of the Architectural Association of Kenya
SPSS	-	Statistical Package for Social Sciences
VM	-	Value Management

CHAPTER ONE

INTRODUCTION AND PROBLEM STATEMENT

1.1 Introduction

The construction industry is one of the most important sectors of the economy. The Economic Survey (2007) indicates that construction industry employed 79,893 persons which is 4.7% of all wage earners in Kenya. Out of these employees in the construction industry, the private sector accounted for 57,878 and the public sector 22,015 persons. The construction industry contributed 4.3 % of the Gross Domestic Product and about 46% of Gross Fixed Capital Formation in year 2006 in Kenya.

The Economic Survey (2007) further states that the total value of approved drawings was Kshs. 26,962,000,000 for private sector, Kshs. 1,426,000,000 for housing and Kshs. 50,600,000 for new public building and Kshs. 36,652,840,000 on roads. The total expenditure on all these amounts to over KShs.65 billion. A 5% saving would yield Shs. 3.25 billion. Loans and advances to the building and construction sector were valued at Kshs. 30,227,000,000 and a 5% saving would yield over KShs. 1.5 billion reduction in borrowed funds.

Despite all this significance of the construction industry in the economy, studies by Mbatha (1986), Talukhaba (1988) and Muriithi (2006) indicate that the full potential remains to be exploited. Muriithi, (2006), enumerated various problems which have tended to reduce efficiency. These problems include time over-runs, cost over-runs, poor quality and functionality, adversarial relations and a lack of proper working relationships between the various participants in the building and construction industry. This observation is similar to an earlier one made by Mbatha (1993).

Earlier research had been carried out which is relevant to this phenomenon. Mbatha (1986) wrote that his research was exploratory and a pointer to areas of further research. The findings of Talukhaba (1988) show that management techniques may be the next thing to introduce in projects in addition to technology and new equipment. Muriithi (2006) researched on methods of contract procurement as a management tool to improve project performance. All the three researches were

geared towards improvement of project performance. They laid a firm foundation to research on various aspects of improving project performance.

Christensen (1993) defined *cost overruns* as an adverse cost variance; costs that are well beyond the initial estimated cost of the project. *Value* is defined as 'how much something is worth in money or other goods for which it can be exchanged for or how much something is worth compared with its price' *Worth* is defined as 'having a value of money' (Oxford Advanced Learners Dictionary, 7th Edition). The two definitions when combined produce a scenario where value becomes a marketing tool. It is at that point when a buyer decides that the product, good or service is equated to or more than the money the buyer holds that a sale occurs. In value management, therefore, it becomes necessary to enhance worth through cost reduction by way of more efficient technology or production process or value adding to ensure or increase competitive advantage among competitors. Value management gives business advantage of stakeholders in the building and construction industry.

Massie (2004) defines *Management* as the process by which a cooperative group directs actions towards a common goal. The process involves techniques by which a distinguishable group of people, the managers, direct activities of other people. Combining the two words, *value* and *management,* it can be argued that it implies a cooperative group of people, not an individual, which directs efforts to add value to a common goal. It is this value addition through practice of value management in the building industry that was aimed at in this study.

According to Mawhinney (2001) the world market of the construction industry was valued at USD 2,970 billion which is about 10% of the world trade. Reducing the amount of unnecessary costs that do not add use or aesthetic functions to the user would provide enormous opportunity for savings and benefits to stake holders. What is good for the whole must also be good for the part. Kenya is part of the world and a similar scenario should obtain.

The total cost of a project includes construction, operation, maintenance and replacement. In order that benefits may accrue to society and stake holders it is necessary to re-look at our construction industry, identify problems and articulate

measures to address the problem. The technique of value analysis hereafter discussed finds relevance and application in Kenya.

The basic function of a project does not change with time or cost or quality or aesthetics. By defining, evaluating and generating alternative ways or methods to achieve basic function of a product, one would be carrying out what is known as function analysis. For instance failure to provide buildings or parts of buildings which properly perform their functions is a common problem in construction industry and it is these that form the basis of function analysis (McGeorge and Palmer, 2002).

1.2 Problem Statement

The construction stage of the project marks the process of realization of a design into a physical product which is expected to fulfil the needs of the developer as articulated in his brief to the designer. It is a crucial stage of the project in terms of resource utilization, composition and concentration (Mwangi, 1989). This statement captures clearly the very critical point at which Value Management, like all other aspects of building industry would have a make or break impact on costs and final economic success of a project.

In a speech delivered on 24th May, 2007, the Minister of Finance of the Republic of Kenya, stated that the construction industry's share of the budget was Kshs. 124 Billion in year 2006. It contributes 4.3 % of the GDP but had improved to 6.4% in 2006. It employs about 4.7% of the national wage earners and can be used to regulate the national economy. A 10% saving on the KShs.124Billion expenditure would realise Kshs. 12.4 Billion which can be put to other needy areas of the economy. The developer's target is to realize the project at its lowest viable cost. The developer therefore engages designers or consultants and contractors who he expects to deliver this.

The developer prepares his brief of wants and needs that the design team interprets and prepares a scheme. The contractor is then charged with delivering the product on site. It is on site that the three parties, the developer, the consultants and the contractor meet to deliver the final product. However, many development projects have not achieved this, and the failure to deliver economically efficient building and

construction projects is abundant. Construction of the official residence of the Vice President's house is not complete 4 years after commencement and the price has more than doubled (Daily Nation, 31st August, 2009).

Although there has always been feedback from designers, architects, engineers and quantity surveyors, the aspect of alternatives, the emphasis to address function to set benchmarks for the design has been dismal if not completely lacking. Each consultant in the team retreats to their offices to implement what may have been discussed and agreed in a design team meeting. There is no function analysis to drive the design. The team ends up in designing to a cost. Resources have become increasingly scarce and this has put pressure to bear on the stakeholders to change tack and embrace new concepts.

The findings of Talukhaba (1988) research show that public construction projects have a 51% cost overrun and 12% for private sector. Muriithi (2006) found that 36% cost overrun resulted from contracts procured using traditional methods and 15% cost overrun by using contemporary procurement methods. Research on life-cycle costs of construction materials, specifically on roof finishes noted that there is need to take cognizance of life cycle cost of construction inputs as one way of addressing cost performance, (Munguti, 1987). Gichunge, (2000) observed that other procurement methods which are more efficient than the traditional method need to be used to reduce on cost and time overruns.

Manifestation of problems that can be associated with lack of application of value management techniques have been written upon and presented in various forums and journal papers. Expounding on the topic of project management Mutunga (2005) concluded that lack of development focus in our managerial approach may, to some extent, provide clues as to why our citizens fail to identify with some of our built development projects, not to mention their failures. The findings of Mbaya (2006) show that the essence of Public Procurement and Disposal Act, (2005), is to define, establish, and enforce procurement procedures that will produce economic and efficient results while reflecting the demands of public accountability of the process and duty of fairness to the supplier.

In Kenya today, the traditional procurement method is the most commonly used procedure to procure contracts but with the advent of the Public Procurement and Disposal Act (2005), new methods have emerged. These new methods include Design and Build, Build Operate Transfer (BOT), Build Own Operate Transfer, (BOOT), among others. Nyasori (2005) challenges the construction industry participants in Kenya to adopt value management principles to bring innovations to the building industry. The argument is that we have always relied on the past experience to address and solve our problems because it has been shown to work. The "past", Nyasiro (2005) writes is our worst enemy because with every passage of time there is a never-ending flow of creative ideas which lead to a better and more competitive solution.

The earliest project to apply value management in Kenya is the construction of the USA embassy at Gigiri (Maweu, 2007). The research extended the study farther afield to explore and understand real experiences in other countries. Rains (2008) reports that the United States of America government realised an average of USD 20 for every one dollar invested in value management. Use of VM has been recognised to be an effective technique for lowering government costs while maintaining necessary quality levels. VM is reported to save costs through identifying cost savings alternatives, more effective use of resources, reducing project, operation and maintenance costs and improving safety programs. It reduces paperwork, simplifies procedures, improves project schedules, streamlines organization structure and cuts down on waste (Mendelsohn, 2008).

The current contract procurement and administration system in Kenya is the traditional method where design is separated from construction. It follows the British system for historical reasons that Kenya was a colony of Great Britain. Quantity surveyors are employed to an increasing extent during design stage to advice the architects and engineers on the probable cost implications of their design decisions. This need has arisen because of the ever increasing complexity of the developer, increased cost of finance and scarcity of resources. Other relevant consultants like civil, structural engineers, landscape architects are usually called upon much later.

Viewed from an architect's standpoint, the quantity surveyor is an encyclopaedia of information on every aspect of building costs including latest products, their costs and comparative costs of alternative products and techniques (Seeley, 1978). Seeley was of the opinion that to be a building economist, it is necessary to go beyond knowledge of costs, new materials and techniques and to also understand the forces in the local and international markets and how they impact on projects both in the short and long run. Thus the current system of the building consultancy industry in Kenya has set up one person, the quantity surveyor, to undertake the cost planning, cost control, cost check and cost optimization, cost check, of the project; it is not a team effort.

The above paragraphs have highlighted areas that project performance can be improved. Experiences outside Kenya show real savings and value addition in projects where VM has been applied. However, none of the researches cited above has addressed value management as a tool for improving cost performance. A gap of knowledge therefore exists in the building industry in Kenya that this research set out to explore. In view of the above this research study sought to show that lack of practise of structured value management contributes to poor cost performance of the building industry in Kenya.

1.3 Research Questions

The following questions were addressed to enable research focus on the problem;

a. What is the extent of application of value management in the building industry in Kenya?
b. What is the extent of awareness of value management in the building industry in Kenya?
c. What are the challenges of application of value management in the building industry in Kenya?

1.4 Objective of the Study

The objectives of the study were to;

a. Investigate the extent to which value management is applied in the building industry in Kenya.
b. Explore the extent of awareness of value management concepts among the building industry stakeholders in Kenya.
c. Identify the challenges of application of value management in Kenya.

1.5 Research Hypothesis

The practice of Value Management **DOES NOT** significantly reduce cost overruns in building and construction projects in Kenya.

1.6.0 Research Methodology

This section presents research design and the research methodology. It discusses the research design, the population, sampling and research tools.

1.6.1 Research Design

The research used data collection method where both quantitative and qualitative data were captured to address the study's main objectives, namely; level of application, level of awareness and challenging factors of practicing structured value management in the building industry in Kenya. Before setting out to collect data, two kinds of questionnaires were designed and pre-tested before presenting them to the respondents. Necessary amendments were made arising from the pilot questionnaires. One questionnaire was designed for the consultancy firms and another one for the Ministry of Public Works.

The research design used to accomplish the objectives conformed to the ethical and legal safeguards for research participants. Costs and management techniques are sensitive issues and it was necessary to assure respondents that data collected would be treated with confidentiality. A letter of introduction was provided by the University.

1.6.2 Study Area

The research study was carried out in the geographical area of Nairobi. Githaiga (2006) had observed that a large number, nearly 90% of architectural and quantity surveying firms in Kenya are located in Nairobi.

1.6.3 The Population

The population of the study is all the firms of architects and quantity surveyors registered by the Board of Registration of Architects and Quantity Surveyors (BORAQS). Registration of firms is continuous. The population of the study therefore was those firms of Architects and quantity Surveyors who were in the register as on

13th July 2008. This was the date that the researcher acquired the list from BORAQS. The total population of registered firms of architects and quantity Surveyors by BORAQS as on that date was 356, comprising 126 quantity surveying and 230 architectural firms. The research targeted the first entry points of value management in building industry, namely consultant architects and quantity surveyors. The study restricted the population to those firms that are registered in accordance with CAP 525 Laws of Kenya since they are the most likely to provide information necessary for the research project and were also more likely to locate.

1.6.4 Sampling Technique and Sample size

Proportionate number of architectural and quantity surveying firms were sampled. Architects play a pivotal role in deciding which project procurement method would be used and which consultants would be employed, all as outlined in CAP 525, Fourth Schedule, Clause A1(c). Quantity surveyors have the largest repository of information on cost of projects.

Purposeful sampling was done on the Ministry of Public Works, Department of Building. This is because the does a multiplicity of activities. The Ministry of Public Works is a consultant, developer and a contractor. It engages in construction work through internally employed staff especially to carry out maintenance works and to construct minor building works. It is also a supervisor and regulator of the building professionals, namely, architect and quantity surveyors in the country through BORAQS. The Ministry is therefore a key informer. For purposes of this research it was necessary to interview them. The Ministry Public Works was for purposes of this research approach as consultants only. Miles (1972) wrote in his finding, that it took the United States of America Government's effort to promote and implement Value Engineering. According to Mugenda (2003), sample size whose population is less than 10,000 is given by the following formula;

$$\mathbf{n} = \frac{z^2 \partial/_2 d^2}{e^2}$$

Where $\mathbf{n}$ = sample size

∂ = Standard deviation of the sample

Z^2 = Critical normal deviate

$\mathbf{d}$ = Estimated population standard deviation

e = Tolerable error level.

The tolerable error for the dependent variable is set in the following manner. Muriithi (2006) research on project performance has chosen a tolerable error (e) of 7% for cost performance and 15% for time performance. Since this thesis is of similar nature, Talukhaba (1988) addressing management techniques to improve project performance, the researcher chose similar tolerable errors.

Target reliability probability (1-∂) and finding critical normal deviate ($z\ \partial\ /2$) was the next parameter to set. A reliability of 95% was chosen and therefore

$$\partial = (1 - 0.95)$$
$$= 0.05$$

The critical normal deviate ($Z\partial\ /Z$) at 95% confidence is 1.96.

To establish value of estimated population standard deviation ∂, a comparative study conducted by Muriithi (2006), on time and cost performance as a result of alternative procurement method; it was found that for private clients the standard deviation as a percentage of cost overruns was 32.33% and 41.58% for time and cost overruns respectively for traditional methods. For projects procured through contemporary methods the standard deviation was calculated at 25.69% for time overrun and 19.5% for cost overrun. This indicates an improvement of project performance as a result of using contemporary methods of contract procurement. Since sampling is done once, sample size from the different standard deviations ∂ was computed as follows;

1) Traditional Method

$$\text{Time} - \frac{1.96 \times 1.96 \times 41.58 \times 41.58}{15 \times 15} = 29.5$$

$$\textbf{Cost} - \frac{\mathbf{1.96 \times 1.96 \times 32.33 \times 32.33}}{\mathbf{7 \times 7}} = \mathbf{81.94}$$

2) Contemporary Method

$$\text{Time} - \frac{1.96 \times 1.96 \times 25.69 \times 25.69}{15 \times 15} = 11.00$$

$$\textbf{Cost} - \frac{\mathbf{1.96 \times 1.96 \times 19.5 \times 19.5}}{\mathbf{7 \times 7}} = \mathbf{29.8}$$

Out of the four, the single largest sample is 81.94 ~ 82

The sample size was distributed proportionately between Architect's and Quantity Surveyors as follows;

Total population = 356

Architects = 230

Quantity Surveyors = 126

Number of Architectural firms $= \frac{82 \times 230}{356} = 52.9 =$ **53 firms**

Number of Quantity surveying firms $= \frac{82 \times 126}{356} = 29.02 =$ **30 firms**

The final sample size therefore was **83 firms** because of rounding off upwards.

1.6.5 Systematic Sampling

To get the sample for both the architectural and quantity surveying firms, Systematic Sampling method was applied on the list as supplied by BORAQS

For architects;

To get the k^{th} number $= \frac{230}{53} = 4.33$

Therefore an architectural firm was picked after every fourth count or interval.

For quantity surveyors;

To get the k^{th} number $= \frac{126}{30} = 4.2$

Therefore a quantity surveying firm was picked after every fourth count or interval.

1.6.6 Research Variables

Mutai (2000) defines a variable as an empirical property that takes two or more values. The variables were identified through operation of the research objectives. The independent variable for this study is the practice of value management which is sub divided into three categories

a) application of structured value management
b) level of awareness of value management
c) challenges of applying value management

The dependent variables are the cost performance in terms of improving on the budget measured in terms of cost overruns and completing the project on time measured in terms of time overrun.

1.6.7.0 Data

1.6.7.1 Data Collection Tools

The questionnaire method was found to be the most appropriate tool for data collection. Two questionnaires were designed: one targeting the consultants and another one for the Ministry of Public Works. The questionnaires included both open and closed end question, to capture quantitative and qualitative data. Two questionnaires were designed and tested.

1.6.7.2 Data Collection Procedure

The respondents who had been identified through the sampling process, were notified of the interviews prior to visiting them. However, due to the tight nature of the respondents' schedules, some opted for self-administration of the questionnaires which were later collected by the researcher. The respondents were requested to provide a list of projects whose contract sum exceeded KShs. 20 million and carried out between year 2000 and 2008. There was no limit on the number of projects to be included in the list. The researcher then picked one project. Secondary data was sought from theses carried out by other researchers, records, journals publications and other relevant literature from libraries, archives and internet. This information was used to complement primary data and was very useful in identifying and clarifying the information gap that existed.

1.6.7.3 Data Analysis

1.5.7.3.1 First Degree Data

The software that was used to analyze quantitative data was Statistical Package for Social Sciences (SPSS). It was used to generate the frequencies and cross tabulations. Data was cleaned and verified before processing.

1.5.7.3.2 Second Degree Data

Qualitative data was analyzed using qualitative content analysis and institutional analysis in order to explore the pattern of relationships of the variables therein. The data was subdivided into coherent categorical patterns and themes for interpretation.

1.6.8 Methodology of Hypothesis Testing

The study uses a single sample KS-test (Cooper and Schindler, 1999) to compare the mean of a sample to a known number 0. The KS-test requirements are that the population must be normally distributed and σ is unknown. The standard deviation of the sample is substituted for the standard deviation of the population such that the statistic does not have a normal distribution, but instead has a KS-distribution.

For each sample size there was a different KS-distribution and it was not practical to list a separate area-of-the-curve table for each one. Instead, critical KS-values for common alpha levels (e.g. .05, .01, .001) are usually given in a single table for a range of sample sizes (See Appendix D). The theoretical distribution represents expectations under Ho. The test seeks the greatest *absolute* divergence between the observed and expected theoretical distribution. This is the D value. The *calculated* D value is compared with the D value in the table and if the calculated D value is greater than the D value in the tables, then there is enough evidence to reject the ***Null*** hypothesis and accept the ***Alternative*** hypothesis. The assumptions are that subjects are randomly drawn from a population; the distribution of the mean being tested is normal, $n > 35$ and σ is unknown. The value of D is calculated using the following formula.

D = Maximum $|F_O(X) - F_T(X)|$

$F_O(X)$ = the observed cumulative frequency distribution of a random sample n

X = any possible score

$F_O(X)$ = k/n

k = any number of scores equal to or less than n

$F_T(X)$ = the theoretical distribution under Ho

α = 0.05

n = the respondents

The critical value of D at 95% confidence for $n > 35$ (see appendix D) and derived from the formula

$$D = \frac{1.36}{\sqrt{n}}$$

Source: Cooper and Schindler (1999)

The method of calculating the value of D in this research study is detailed below in Table 3.1

Table 1.1 One sample statistics

	Variables	Variables	Variables	Variables
Frequency n				
$F_O(X)$				
$F_T(X)$				
$\lvert F_O(X) - F_T(X) \rvert$				

Source: Researcher, 2009 – Adopted from Cooper and Schindler page675

1.6.9 Data Presentation

Data was presented by use of various techniques. These include tables and pie charts as appropriate.

1.7 Study Assumptions

The study assumes that value management can be applied in any project irrespective of the contract procurement method used. The study also assumes that changes observed in cost performance in this research are a result of application of value management whether in a structured form or otherwise. Other influences are minor and of no consequence.

1.8 Significance of the study

Leeuw (2001) observed that Value Management has been practiced in one form or another but not in a structured way or under the title value management. Experience in other countries, namely the U.S.A, United Kingdom, Australia and Japan indicate methods of application and advantages of structured value management practice in the writings of McGeorge and Palmer (2002). The study will show that application of structured Value Management has an edge over other methods adopted in the past or currently being used in Kenya. The findings of this study if implemented would release considerable resources which will be directed to other needy areas for faster national economic growth. The little savings accruing from individual projects would therefore add up to significant savings in the National economy.

1.9 Scope of the Study

The scope of the study was limited to one building project from each sample firm of architects and quantity surveyors. The study sampled both private and public sector projects. Each respondent was requested to providing data for one building project whose minimum contract sum was Kenya Shilling Twenty Million (KShs. 20,000,000) only at year 2000 prices.

1.10 Limitations

The study was limited to Architectural and Quantity Surveying firms only whose offices are in Nairobi area and its immediate environs. Nairobi is the capital of Kenya and has a large concentration of contractors, consultants and clients. Results of findings were easily extended to the rest of the country because most projects in Kenya are promoted, designed and built by stakeholders based in Nairobi. Other stakeholders, namely, Engineers, developers and contractors, were not included in this study. This was to ensure that data collected was manageable within the time and resources available.

1.11 Operational Definitions of Terms

a. **Value Management is defined by Kaufman (2004) as** the organized effort directed at analyzing the functions of goods and services to achieve those necessary functions and essential characteristics in the most profitable manner.
b. **Structured Value Management:** The formal practice of value engineering/ management as opposed to ad hoc practice
c. **Value Engineering**: The process dealing with pricing the functions of alternative methods, materials, technology and services.
d. **Value Analysis**: The process of identifying and ranking, functions of a product, service or technology
e. **Value Criteria**: The ranking and identifying the most significant function that must be fulfilled and costs involved.
f. **Traditional Methods**: Procurement of professional and construction services where design is separated from construction.
g. **Contemporary Methods:** Procurement of professional construction services where design may be separated from construction.

h. **Stakeholder:** Any body with an interest in the process or outcome of the project or built facility.

i. **Consultant**: Any person engaged by the client to provide professional services

j. **Professional**: Any person who professes and practices a body of knowledge

k. **Client, Developer or Promoter**: An investor who intends to or puts up a building or construction facility within the field of study

1.12 Chapter Summary

This chapter has outlined the problem of cost overrun in the building industry. It has outlined the various manifestation of cost overruns as observed by consumers of the built facilities especially the client and developers. Cost of construction inputs has continuously risen and any savings would be invested in alternative ways. The next chapter shall delve into the related literature to expound further how value management has been developed and applied elsewhere in the world and results achieved.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Leeuw (2001) states that value management has been practiced in one form or another, in the construction industry for a long time but it has not been practiced in a formal way. The informal practice tends to blur the distinction and therefore benefits of value management. It is not easy to realise the difference, but when practiced in a structured manner and therefore distinct from other methods of cost management, the benefits are clear. The structured approach which includes function analysis and brainstorming or creativity session forms an integral part of the process and the process provides an edge for value management over other methods adopted. To bring this into a sharper focus, it is important to appreciate the role of construction industry in the economy.

2.2 Theoretical Framework

Talukhaba (1988) in his research found that project performance may be improved through application of new management skills and tools other than new equipment and technology. Dunn (1985) observed that there were legal problems that may hinder application of new concepts especially in the public sector. Fortunately the Public Procurement and Disposal Act (2005), opens up new frontiers on methods of procurement and administration of building and construction industry in Kenya. This is one area which the research explored to find the optimal intervention points of value management practice. Others who have researched on application of new management techniques in the building industry include Muriithi (2006), who researched on procurement methods and Ombati (2007), who researched on the use of value management to reduce conflicts in the building industry. Munguti (1997) had researched on life cycle cost in building materials with an emphasis on roofing materials.

This research explored value management as a tool for cost management in the building industry. It looked at value management being applied as a separate service where the developers shall require their development projects be subjected to value

management exercise. This presupposes that value management can be applied on any project contact procuring method.

According to Miles (1972), the practice of value engineering started during World War 2. After the 2nd World War, General Electric Co. of the United States of America (U.S.A) assigned one of its electrical engineers to research further on ways of providing alternative products to perform similar work of a given product. His research brought in new and cheaper products. Other manufacturing companies took cue and invested in value engineering. However, building and construction industry has been slow to take up value management/engineering and it is only through government legislation that it picked in the U.S.A. public sector.

Mbatha's research (1986) shows that sensitivity performance index of 1.9 had been established. This index states that the larger the project the higher the sensitivity to cost overruns. A lot of resources were shown to be at stake and this called for special consideration of running big projects. In other words big projects should not be subjected to same procedures of implementation as small ones. Small projects were considered to be those whose contract sum was less than Kshs. 0.5 Million by 1986.

Value management results in effective cost savings on investments both in life cycle and initial cost of inputs. It would result in cost optimization in investments of construction projects. Mbatha, (1986), states that between 1977 and 1982 inclusive, the building and construction works contributed a mean total of K£184 million to capital formation at 1976 constant price. The building sector alone contributed 48.19% of the total capital formation for the whole economy and improvement in performance in this sector in view of its value, would mean a sizeable savings for the nation.

2.2.1 Construction industry and the National Economy

The construction industry is an important segment of the national economy. The Public Procurement and Disposal Act (2005) of Kenya attempts to manage and control, among others, cost of construction projects (Mbaya 2006). A 10% saving of the national government expenditure on building and construction would raise Kshs. 12.4 billion, and these saved funds would then be channelled to other needy areas.

The Centre for Advanced Engineering (CAE) (2004), states that the UK Construction Excellence and Australia Construction Innovation programs clearly show that economic performance improvement is possible but it requires committed leadership, customer focus, process integration and team driven agenda. Studies by CAE (2004) show that the New Zealand construction efficiency could rise 10%, which could lead to $1.3billion increase in GDP. Thus the building industry plays an important role in the economy.

2.2.2 Construction Industry and the Project

Cited by Muriithi (2006), Chitkara (1998) defines the construction industry as the total industry activities type which involves the utilization of human economic and natural resources at conceptual, design, construction maintenance and eventual disposal of the built facility. In yester years, resources were considered as not scarce but the present times have needed to undertake economically sustainable construction. A project consumes time, money natural resources and labour (Kerzner, 2001). It has a cost, time and resource limit. The success of a project is defined by Leeuw (2001) as including completing it within time, quality and cost. One of the items that the project team works against is time and budget to produce specific results. The specific results are then measured up against time, cost and quality to assess the project success.

2.3 Temporal Dynamics in the Construction Industry

Materials, equipment and construction systems are ever changing through changes in technology. The need to construct quickly and economically without loosing quality however remains. For this to happen, the bits and pieces of what goes into a building project need to be analysed carefully. This requires a different approach to the design, management and construction of the project. Dunn (1985) observed that the team concept of owner, designer and contractor has worked exceedingly well in the private sector. Meticulous analysis of the design and material input was found to remove up-to 20% of the cost of construction. As noted earlier construction industry has observed increased awareness and application of alternative methods of contract procurement in Kenya. It can be argued that these alternative contract procurement methods also open

a window of alternative cost optimization methods and techniques and one of the techniques is value management.

2.4 Objective of Value Management

Value management requires deliberate action to improve costs (Kaufman 2004). Deliberate action requires education and training, planning, organizational identity and accountability. value analysts or consultants require this training to be able to practice value management. Cost effectiveness includes cost reduction, effort to avoid costs, increase sales and, therefore, improve profits. This is one clear difference between cost reduction and value management and to achieve cost effectiveness, there are various steps to be followed: namely, the structured value management, function analysis and action to remove unnecessary costs.

Cost overrun arises from three main areas; technical, psychological and political-economic. Technical explanations arise from imperfect cost forecasting techniques, inadequate data and design flaws. Psychological explanations account for overruns in terms of optimism bias with forecasters, whereas political-economic explanations include strategic misrepresentation of scope, budget and location for reasons not beneficial to the project. These are project risks that must be foreseen and it is always advisable for every project to have a contingency fund. However this contingency fund may not be anywhere near to fulfil cost overruns. Studies elsewhere show that Sydney Opera house had a cost overrun in excess of 1,400%, the America Big Dig was 275% over budget.

Here in Kenya, projects abound and especially in the public sector. Findings of Muriithi (2006) research show cost overruns averaging 36% in the public sector and 15% in the private sector.

Horngren, Datar and Foster (2003) wrote that pricing is a management decision about what to charge for a product, or service. These are strategic decisions affecting quantity produced and sold and revenue and costs. In a competitive market, quantities manufactured or units of service rendered are dependent on the unit costs and in order to maximize operation income, the contractor would have to provide more and more construction services and products. Competitive markets tend to reduce ability to

secure contracts if unit rates of construction are perceived not to be competitive. Similarly the developer needs to approach increase in operation income through reduction in costs of inputs or processes.

Consultants are not left behind in pricing their services. In order to appreciate costs, management needs to understand cost drivers, cost behaviour, pattern and concept of relevance. This will help management to manage costs throughout the value chain and product life cycle and maintain profitability. To the consultants, developers and contractors, developing a cutting edge in the construction industry through value engineering and management would most certainly guarantee more jobs and contracts and sales. The contractor's sale price is the developer's cost and the lower the cost to the developer the higher is the operating income.

2.4.1 Pricing

To the contractor, the market based pricing is normally applied on products that are homogeneous. The product is similar and can be supplied by many firms or companies in the industry. Whereas the constructed facilities in building industry are different, the basic unit inputs are similar. Concrete of a specified quality remains concrete irrespective of final location, shape or form, or finished product. The decision making from management is how to reduce costs of the inputs and processes of manufacturing or producing the unit.

Target cost is a market driven method of pricing. It is the estimated long-run cost per unit of a product or service which enables the company to achieve its operating income per unit when selling at the target price (Drury, 1998). As stated earlier the unit input in construction is homogeneous. There is common established cost of inputs and processes that management decision must try to reduce yet retain net positive operating income. Target cost is usually lower than the already established cost and it is the lowering of existing cost to the target cost that requires a systematic and coordinated effort to achieve.

The objective of pricing is the project. As stated earlier, it is on site where the designer, contractor, and developer meet to carry out the project to successful completion (Mwangi, 1989). The developer's target price per unit of measure is seen

as that price which gives maximum returns at the least cost. The consultants or design team have the market rates at the time of design and are charged with the responsibility of setting and achieving target costs at design stage. This calls for approaching the design through innovative techniques of construction, alternative materials and economic layouts.

The contractor's target costs are achieved through innovative construction techniques that are cost effective and alternative materials that achieve similar or better use and/or aesthetic function. Other techniques include managerial skills, overhead controls and financing. Some of these techniques are now being applied in Kenya through the new contract procurement method. They include design and build and private sector financing.

Horngren, Datar and Foster (2003) lists four steps that are essential to achieve target pricing and target costing. They include: develop a product that satisfies the needs of potential customers, establish a target price, derive a target cost per unit, and fourthly, carry out or perform value engineering to achieve target costs. This is a systematic evaluation of all aspects of the value chain business functions with the objective of reducing costs while satisfying customer needs. Value engineering results in improved product designs, changes in materials, specifications or modifications in the process methods.

2.4.2 Identifying and Removing Unnecessary Costs

It is useful to distinguish value added activities and costs from non-value added activities and costs. Costs are value added if by eliminating them this would reduce the actual or perceived value or utility the customer obtains from using the product or service (Miles, 1972). Conversely, a non-value added cost is a cost that if eliminated would not reduce the actual or perceived value or utility a customer obtains from using the product or service. It is a cost that the customer is unwilling to pay for. Such costs in construction industry in Kenya and elsewhere include rework, repeat work, abortive work, multiple handling of materials, labour unrest, over-design, poor space utilization, etc.

Value engineering tends to remove non-value added costs by reducing the quantity or number of cost drivers of non-value added activities. Value engineering also seeks to reduce value added costs by achieving greater efficiency in the value added activities. To achieve this, it is necessary to distinguish when costs are incurred and costs that are locked in. Costs incurrence refers to when a resource has been consumed or a benefit is foregone. Costs are incurred, for example, when a bag of cement is mixed with aggregate, sand and water.

Opportunity to recoup or change design of the mix is lost and costs cannot be recovered after incurrence. Costs are locked in when they are not yet incurred but decision has been made as to what material and quantity shall be used per unit product item. Costs have not been incurred yet but are locked in through design. Incurrence costs can be addressed before they are incurred. A mistake can be corrected through redesign to improve quality and reduce repeat or rework before the next cost is incurred. However, designed in costs are difficult to adjust because this may require a redesign of a product which may not be viable. Locked-in costs can be costly and difficult to fix, and examples of projects abound where developers have incurred high costs without commensurate product or space.

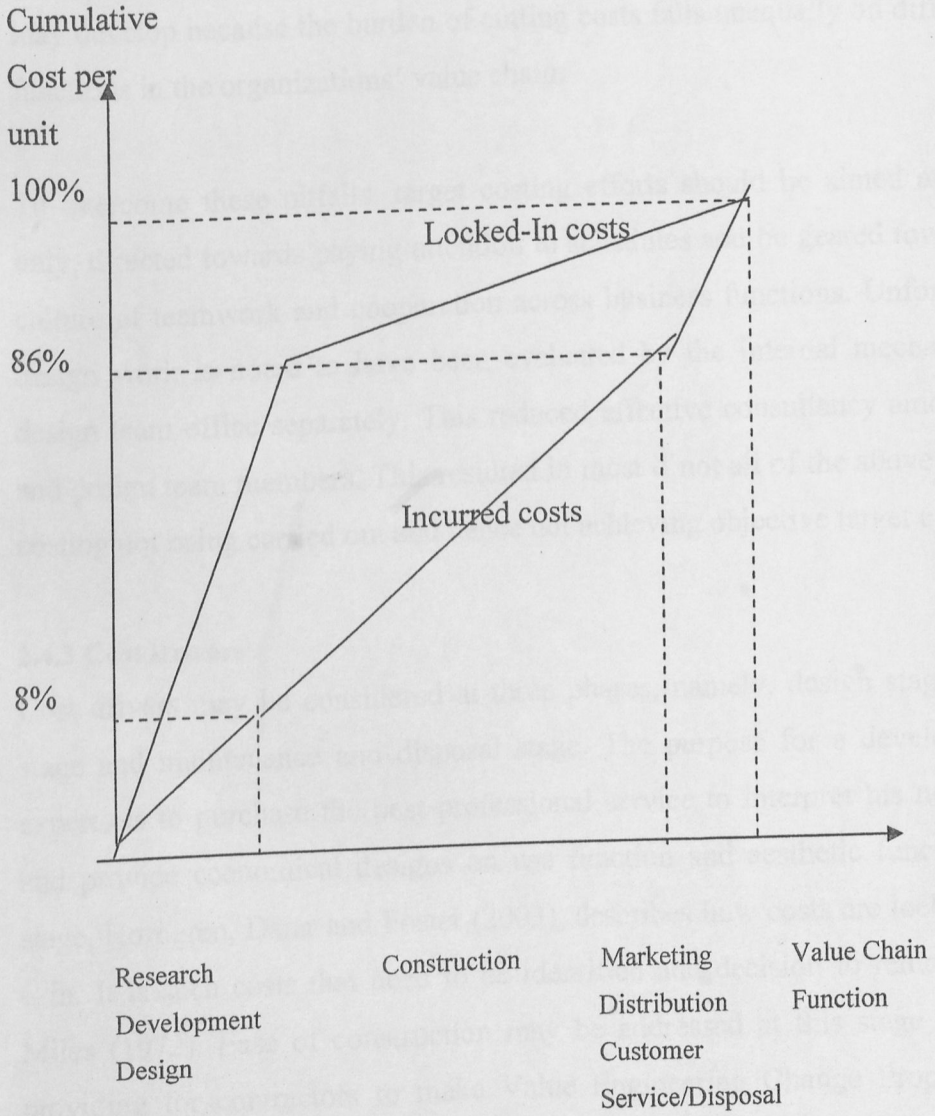
Design decisions that affect value added and non-value added costs in various value chain functions include;

a) Programming work execution on site such that activities follow in sequence without rework to assemble next piece of work.
b) Simplify design, to avoid unnecessary wastage and re-order for additional materials.
c) Use lighter designs and avoid over-specification.
d) Use quality control vigorously to reduce rework.

The figure below *(Figure 1)* shows a wide gap or divergence between locked in costs and incurred costs. It shows that in construction industry, about 86% of costs are locked in during design stage when only 8% of total costs have actually been incurred. The emphasis is, therefore, in design stage when little costs are incurred, yet this is where costs are designed or locked in. This is where maximum benefit may be realized through application of value management before commencement of work on site, i.e. before construction costs are incurred. It is observed however that costs of

design are locked-in and incurred at almost the same time. This is one reason to ensure that value engineering is carried out early in the design stage. The project would take advantage of relevant team members' to participate meaningfully in a value engineering session.

Figure 1: Incidence of incurrence costs and locked in costs



Source: Adapted from Horngren, Datar and Foster (2003) Page 418 Exhibit 12.4

To attain target costs, companies use Kaizen or continuous improvement methods which are aimed at improving productivity and eliminating waste through value engineering and redesign. After actual costs are established management would

compare actual costs with target costs to gain insights about improvement that can be made in subsequent cost targeting. It must be noted that not all value engineering exercises achieve desired effects; it has to be managed properly. Some pitfalls as detailed by Horngren, Datar and Foster (2003) include cross functional team adding too many features than what the customers want just to accommodate different wishes of team members; a product remaining in development stage for a long time as alternative designs are evaluated over and over again; and organizational conflicts may develop because the burden of cutting costs falls unequally on different business functions in the organizations' value chain.

To overcome these pitfalls, target costing efforts should be aimed at the customer only, directed towards paying attention to schedules and be geared toward building a culture of teamwork and cooperation across business functions. Unfortunately, most design work is noted to have been evaluated by the internal mechanisms of each design team office separately. This reduced effective consultancy among the project and design team members. This resulted in most if not all of the above items of target costing not being carried out and hence not achieving objective target cost limits.

2.4.3 Cost Drivers

Cost drivers may be considered at three phases, namely, design stage, construction stage and maintenance and disposal stage. The purpose for a developer to consult experts is to purchase the best professional service to interpret his needs and wants and provide economical designs on use function and aesthetic function. At design stage, Horngren, Datar and Foster (2003), describes how costs are locked or designed – in. It is such costs that need to be identified and decision to remove them made, Miles (1972). Ease of construction may be addressed at this stage with a view to providing for contractors to make Value Engineering Change Proposals, (VECP), together with their tenders and also during design and construction stage.

Traditional contract procurement procedures in Kenya do not currently allow for any deviation from design either at tender and/or construction stage. Whereas this may be a cardinal rule both at tender and at construction stage to ensure common basis for tender and evaluation and professional liability during construction, it may be worthy

to request any value engineering change proposal to be submitted together with tender at tender stage.

Value engineering change proposals (VECP) would also be encouraged with a view to achieving better or more efficient and cheaper methods of construction and shorter completion periods. The relevant designer, engineer or architect would evaluate the (VECP) to ensure it meets required functional and/or aesthetic standards. At disposal or running cost stage, most designed – in costs would have been incurred and there may be very little room for change but proper maintenance regime would be encouraged to obtain an economically viable built facility.

2.5 Intervention Points

Value management theory has addressed and identified high impact intervention points. The high impact intervention points or milestones are:-

a) Feasibility stage: Only ideas at this stage are discussed. These are exploratory ideas of various investment opportunities which exist and what options are likely to be chosen from. A priority is developed at this stage. Minimal costs incurred should the project not proceed further.

b) Briefing stage: At this stage the client would form a skeleton team of consultants with senior managers and alternative perspectives are discussed. Again minimal costs would be incurred.

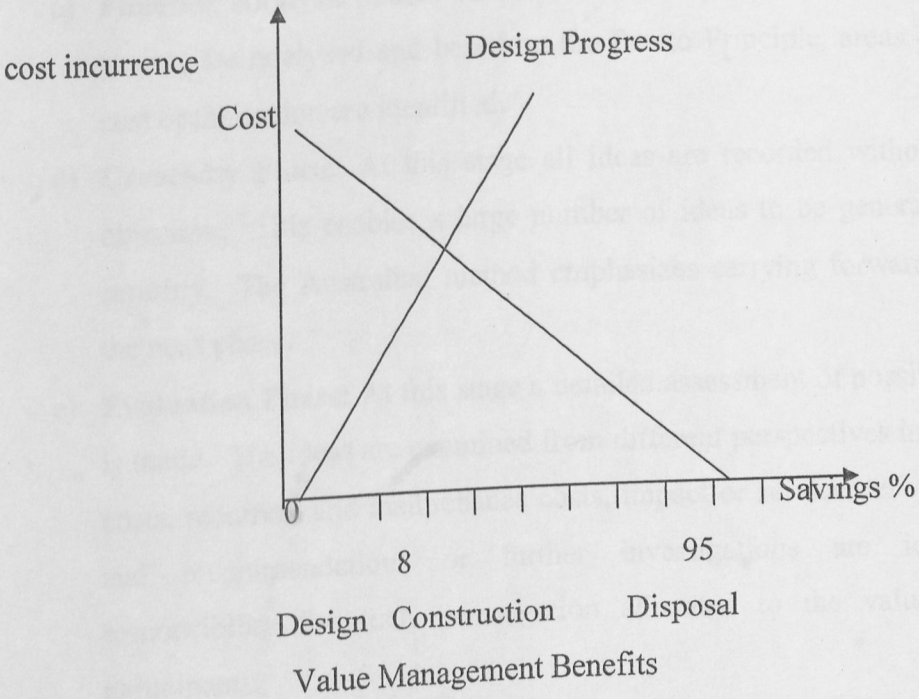
c) Concept design/sketch design stage: At this stage special needs would be prepared. They would be presented to client for further development. Again some costs would be incurred.

d) Detail design: At this stage upto 75% services cost would have been incurred but this is still a small fraction of the total costs. Based on a percentage fee on cost of construction, this may only be 8% of the total project construction costs. Up-to this stage, changes in design or total abandonment of the project would not cost significantly.

e) Construction stage: This is a very critical stage: Most costs incurred at this stage would be huge and likely to frustrate cost performance of the project. Such costs include mobilization by project participants, actual work done,

financial commitment and redesign fee. A value management exercise at this stage may only achieve minimal savings. A graphic presentation of impact of savings would be as follow.

Figure 2: Diminishing ability to benefit from Value Management as design project develops through milestones



Source: Adapted from McGeorge and Palmer (2002)

Leeuw (2001) has combined detail design with constructions stage. It is still not too late to abandon a project before award of the contract and incur relatively small losses of research and design fees. It is after award of the contract that huge losses would be incurred arising from mobilization, demolitions and contractual claims should there be need to abandon or alter constructed works. Furthermore, different concepts of procurement methods would require different entry points of the contractor.

2.6 Phases of a Value Management Study

Many writers like Miles, (1972), Leeuw (2001), and McGeorge and Palmer (2002), have identified stages or phases of value management and are generally in agreement that there are seven phases which include;

a) **Information phase:** The value management team is provided with information through written notes or hand-outs and presentations. This is intended to make them fully aware of the project rationale, amount of planning already done and preliminary work carried out to date.

b) **Objective Phase:** At this stage an objective evaluation of the project is carried out. The project promoters are requested to justify and explain all aspects of the project support areas, locked-in decisions and justification.

c) **Function Analysis phase:** This is a critical stage. The functional aspect of the project are analyzed and based on the Pareto Principle, areas of high impact cost optimization are identified.

d) **Creativity Phase:** At this stage all ideas are recorded without criticism or objection. This enables a large number of ideas to be generated for further scrutiny. The Australian method emphasizes carrying forward discussion to the next phase.

e) **Evaluation Phase:** At this stage a detailed assessment of possible alternatives is made. The ideas are examined from different perspectives including capital costs, recurrent and maintenance costs, impact or service delivery, etc. Ideas and recommendations or further investigations are identified with responsibility for such investigation allocated to the value management participants.

f) **Development Phase:** The identified alternative ideas are further evaluated this time in the office by value management team members or project team.

g) **Reporting and recommendation phases:** At this stage the value management study is complete and final recommendations forwarded to the employer for action. The recommendations are then tested against the objectives determined earlier in stage (b).

These are essential milestones in the carrying out value management and have been investigated to find out whether or not they are being done in the construction industry in Kenya.

2.7 – Cost Planning Theory & Techniques

At inception stage, the developer considers his requirements and then appoints an architect to whom the brief is presented. The architect then carries out an inception feasibility study and an initial cost plan is developed. Nott (1960) emphasised that the

essence of cost planning is to enable the architect to control the cost of a project while still designing and the earlier the process starts the greater the measure of cost control can be exercised over the ultimate cost, quality, time and design. Nott strongly advocates that cost planning should be a continuous process with progressive cost checks being done from time to time and in relatively more detail at each subsequent time. Another merit of cost planning is that it introduced a procedure into the design stage where previously nothing systematic existed.

Costs play crucial roles throughout the process of design. Costs influence the size of the project and its general form. Costs dictate the overall size of the project on total built up area, distribution and level of general standard of the construction. These effects are observed at briefing stage and investigation stage. At briefing stage the architect and client decides how much the project should cost or what size and quality of project can be fitted within a certain budget. When these cost limits are set it is the responsibility of the architect to design the project in such a way that the tender sum shall not exceed the budget or cost limits. Thus the first cost influence is to set the total budget and the second cost influence is to allocate cost to various sections of work or setting how the money is to be spent.

The first aspect i.e. budget is set usually through single-unit cost estimates or approximate cost estimating. The second phase is achieved through cost plan. A cost plan sets target cost limits to various elements of the project. Qualities of a good cost plan are that the cost plan can be compared to other previous but similar projects and it can be checked (Ramus, 1981). In coming up with the cost limits, the architect shall use previous projects after deciphering the client's requirements.

2.8 Activities of Design Phase

Briefly the design stage has a number of phases that the design team led by the architect has to pass through. These activities include.

a) *Client's briefing stage:* The architect has to establish the client's requirements. The client may press for indicative cost estimate even before any drawings are made. To achieve the clients requests on indicative costs, the design team uses previous projects of similar nature and adjusts for market influencing

factors like, time, location, site conditions etc. and then comes up with an indicative cost estimate.

b) *Investigation stage:* At this stage outline drawings are to be prepared after surveying the site and indicative construction alternatives proposed. The quantity Surveyor will come up with alternative cost solutions to each alternative proposal made.

c) *Sketch Design:* Most planning problems would have been resolved and outline design proposal prepared. These sketch drawings include plans sections and inputs from other consultants like structural, civil, electrical, and mechanical Engineers. Finishes would be proposed together with various forms of construction. The quantity surveyor would then check the approximate cost estimate. Using extensive information data the quantity surveyor prepares the first cost plan. The cost plan sets out cost targets for various elements and sections of works. This is the initial cost plan to be implemented and it forms the first firm budget for the project.

d) *Construction design:* At this stage sketch plans are finalised and the team is about to commence on working drawings. It is important at this stage to get confirmation from the client on details to avoid future alterations. A cost check is carried out by the quantity surveyor to cross check the cost plan and any necessary alternative proposals made. These proposals are essentially on details and schedules of finishes and sometimes on alternative forms of construction.

e) *Working Drawings:* At this stage final production or working drawings are prepared and bills of quantities produced ready for tendering process. The quantity surveyor now carries out a final cost check with the bills of quantities first before tender action.

2.9 Cost Control Procedure

The cost controls are usually determined by how and when cost limits were set, Seeley (1978) concludes that there are three main arrangements which include;

1) Accommodation requirement being prescribed by the client at the outset and cost limits established early in design stage. It is the accommodation that is paramount.

2) Both accommodation and budget being set by the client. This usually happens when the developer has experience in building projects.
3) The budget limit is set and the architect has to come up with maximum accommodation within this budget.

In all these cases, cost control will be carried out at various stages. The cost control is set early. The term cost plan is an all encompassing term. It includes, cost analysis, cost planning, cost comparison, cost checking, cost reconciliation, all done before tender and cost monitoring and reporting during post contract stage.

Cost control is carried out at various stages of the project namely design and construction stages. These cost controls include initial or feasibility cost budgets and cost plan before any drawings are prepared; preliminary cost studies based on preliminary approximate quantities to compare alternative materials and systems, cost check at detailed design stage using approximate quantities estimates, pricing the bills of quantities before tendering and preparing specifications, schedule of rates, checking and reporting on received tenders or agreeing on negotiated tenders.

The other stage is during post contract where monitoring and reporting costs especially those arising from variations is key to maintaining project within budget. The final stage is to carry out final measurement and agreeing on the final contract sum with the contractor.

In all the stages there is no specific area where the design team is called upon as a matter of procedure, to discuss the project and various alternative materials and construction techniques that may yield better value for money. The main thrust of cost planning is to contain the works within a predetermined budget and not to achieve same work at a lower cost or derive better or bigger projects from the same budget.

Applying cost planning and control techniques demands that the design team continually examines the cost aspects throughout the design stage. The team must ask such probing questions as in whether a certain feature, works or material gives

value for money; does the material or component provide the best solution to the required need. The team also has to balance quality of the works required with cost of the works e.g. ornamental projects would be more expensive per unit cost whereas basic projects would have a lower unit cost because these two projects are designed to serve different purposes.

There is no cost planning method that can be applied universally. In the recent past various cost planning techniques have been established but they can be put in two broad categories, namely, elemental cost planning and comparative cost planning. The elemental cost planning sets cost limits for each element or component of the works. The sum of these elemental costs form the budget to which the design team endeavours to design to. This is the design-to- a- cost method.

In the other systems, various design options are proposed and costs attached to each proposal. The client and design team then chooses the option that best fit the requirements. Thus this is the costing- to- a –design method. The choice of which method to adopt is dependent on the quality of project required, level of finishes, target user and availability of funds. However, whichever cost planning method is adopted, thereafter it is up to the design team to fit the design within that budget.

2.10 Summary

Related literature has been reviewed and addressing more on the concepts and theory of value management. The next chapter looks into the application.

CHAPTER THREE

VALUE MANAGEMENT: APPLICATION

3.1 Value Management: Global Perspective

As mentioned before, value engineering and management started in the United States of America during the Second World War (Miles, 1972). Supply of certain goods and raw materials was hampered by the war. General Electric Co. sought to get alternatives and assigned one of its engineers the task. Engineer Miles sought to get alternatives that could fulfil the function required. The results generated a lot of interest because the alternatives were cheaper and sometimes performed better than the unavailable goods or raw materials.

After the war, other industries in the United States of America followed cue of the new concept and invested in further research. The concept spread to other countries including Australia, the United Kingdom, India, Indonesia among others. According to Leeuw (2001), value engineering and management is not entirely new but has been practiced much longer but without any structured form or referring to the practice in the same name. This suggests that building construction consultancy services do contain aspects of value engineering and management.

It should be noted that the contract procurement method in the British system and most commonwealth countries is very different from the United States of American system because it does not specifically call for application of value management. This may have contributed to the slow adoption of value engineering and management system of cost management in the British and Commonwealth countries. CAP 525 Laws of Kenya that spells out the duties and remuneration for architectural practice does not provide for value management.

From a historical perspective, value engineering and management is a relatively new concept. It has been developed to its current level in the last 70 years. The concept of value engineering picked well in the United States of America and in 1953, The Society of American Value Engineers (SAVE) was formed. Value engineering then started to spread outside the United States of America and in 1959 SAVE

International was founded to enable internationalisation of the practice. It is only in the 1990's that standards were established.

Farmer (2003), states that Australia was the second country in the world after Germany to establish a standard in 1994. Thereafter other countries including the United Kingdom, have established standards for the practice of value engineering and management. According to Maweu 2007), the earliest recorded practice of value management in Kenya, was in the construction of the United States of America Embassy at Gigiri. This is because the project is for the Government of the United States of America; it was designed by Americans and implemented by Americans and there is a policy of the Government of the United States of America to apply value management in Government projects. As late as year 2007, there have been attempts by members of the association to form a Chapter for Project Management in the fraternity of the Architectural Association of Kenya. This would be a good starting point to sensitize, educate, promote and establish a formal centre for reference on consultancy of project management and in it, value engineering and management.

3.2 Value Management as a System

Value management is still a developing concept. It is currently a grouping of components which differ from country to country. There is no set framework of what is right or not right and contractors and designers may opt for that component that suits their circumstance. Since the concept of value management is relatively new in Kenya, the researcher looked into sample case studies cited by McGeorge and Palmer (2002), carried out in four countries, namely the U.S.A, United Kingdom, Australia and Japan, all these four countries have practiced and documented structured value management longer than other countries.

3.2.1 The American Value Management

The American System is based on 40 hour workshop carried out by an external team at 35% design stage. It included carrying out the value engineering exercise outside the usual work place. The project design was developed to enable function definition to be at Elemental Function.

Department of Defence Training Building: The project was a department of defence training building with an estimated cost of USD 2.4 Million. The facilitator and consultants were external. The value management exercise was carried out at 35% design stage on elemental function and a 40 hour workshop. The team proposed savings of USD 535,980 but only USD 154,000 was achieved. The cost of value management was USD 21,162 thus giving a 7.3 return on investment. The realised USD 154,000 is about 6.4% savings on the contract sum and about 50% of the design team fees!

3.2.2 The UK Value Management

The British value management system takes place much earlier than the American one. It comprised the design team and an external facilitator. Function analysis is used to generate alternatives and costs are usually not of the essence at this stage. Alternatives are generated to improve on the whole project. Since design team is used for the value management exercise cost of study is usually minimal.

Refurbishment of a Public Building: The case study project was refurbishment of a public building. The objective of the study was to develop a control brief document. The study and resultant brief covered various aspects of the project, which included examination of strategic issues like examination of users i.e. staff, visitors, callers, their needs, background, community it serves, political background, adapting to new and future technological changes, funding, safety, security among others. The value management team gave strategic advice that included combining staff of the two buildings. They also advised on co-ordination of maintenance and capital budget that would yield better value.

The design team and (FAST), Function Analysis System Technique was used which looked at analysis of importance of time, money and quality. Users and user flow diagrams were proposed, space definition and appropriate relationship of spaces or rooms and prioritized action programs were prepared. The study was carried out over two days. The value management team included client's representative, members of staff and building users, architects, electrical and mechanical engineers and two quantity surveyors as facilitators.

The main thrust of this exercise was to improve on the use of the building other than costs. Apart from the facilitator all other persons were part of the design team or client's office and, according to McGeorge and Palmer (2002), the cost of the study was thus **greatly reduced.** The design team provided value management services at minimal additional cost to the client.

3.2.3 Value Management in Australia

Australia, according to McGeorge and Palmer (2002), being a dominion of the United Kingdom and having similar contract procurement systems, has similar characteristics in value management. However, value management is more entrenched in Australia and the Department for Public Works and Services (DPWS) has made it a mandatory requirement on all projects whose value exceeds AUS Dollar 5 Million to carry out value management. The DPWS has produced an extensive set of value management guidelines which covers the nature of value management, value management policy, concept and application, process, procedures, evaluation matrices and case studies. The Queensland Code of Practice (2000) for the construction industry, includes a chapter on continuous improvement and best practice which enhances practice of V value management.

3.2.4 Value Management in Japan

The Japanese approach to value management is completely different from either the USA or the UK system. In Japan value management is a continuous process and is carried out throughout the construction cycle including planning, maintenance and environmental protection (McGeorge and Palmer 2002). This system operates because the contract procurement method is significantly differently from the U.S.A or UK method. Design and build is the usual form of contract procurement in private sector, but in the public sector, procurement is more or less in the traditional method where design is separated from construction. Value management is therefore a 2-stage process, the first during design and the second during construction by the contractor.

Kobe City Housing Project: McGeorge and Palmer (2002) conducted a research of a public sector project that included selected contractors who took part. Each contractor was given a set of design drawings from consultants and an outline of costing and procedures for value management application. The contractors made

proposals for value management but without any costing and submitted these proposals to the client. The client then studied and classified the value management proposals as good or not good and returned them to the contractors. The contractors then submitted final proposals including costing on those items classified as good. The tender was then awarded to the lowest bidder at a price at most, equal to the original tender at time of selection of contractors. In most cases, a certain percentage of the savings is paid to the contracting company for their efforts.

This approach would encourage continuous improvement throughout the construction. It may encourage closer working relations between consultants and contractors and at the same time reduce the Do-As-I-Say situation which currently exists in the construction industry in Kenya. The provisions of the Agreement and Conditions of Contract for Building Works (1999) require the contractor to carry out architect's instructions without queries. It does not provide for the contractor's input. The closest the contractor's input on design provided is for 'equal and approved' and "at no extra cost to the client". This arrangement does not provide for savings to be availed to the client when contractor installs "equal and approved" product, input, or technology that saves money.

3.2.5 Kenya Situation

Kenya was a colony of the Great Britain. The business traditions, standards and concepts have been inherited from the British system. The construction industry in Britain uses the quantity surveyor who has been a link between design and costs for a project. The quantity surveyor in the traditional setting has been carrying out initial cost plans, detailed cost estimates, revised cost plans, cost checks and financial management of the project among other roles.

Although there has always been feedback from designers, architects, engineers and the quantity surveyors, the aspect of alternatives, the emphasis to address function to set benchmarks for the design has been dismal if not completely lacking. Each consultant in the team retreats to their offices to implement what may have been discussed and agreed in a design team meeting. There is no function analysis to drive the design. The team ends up in designing to a cost. Resources have become

increasingly scarce and this has put pressure to bear on the stake holders to change tack and embrace new concepts.

Value management comes in handy to address time, cost, and quality for the successful implementation of the project. There is need to establish a standard for the practice of value management in Kenya. Currently there is none. The standard needs to be packaged to enable easy promotion and marketing of value management. In his finding, Farmer (2001) there was need to revise the existing standard in Australia because it was too basic and had opened value management to criticisms that there is no special need for it. The standard needed to be repackaged to be able to market value management to a wider audience. The standard was also required to emphasize on function analysis other than job plan. Perhaps these same problems have hindered development of value management in Kenya and especially so when there seems to be no apparent need for it.

3.2.6 Differences in Value Management Systems

McGeorge and Palmer (2002) state that different systems of value management are a reflection of the differences in culture of a people. Projects are a reflection of the social, economic and culture of a people and such differences are reflected in everything that a community does. The differences in culture are actively observed in the management style or system for the people. The American will go for short, quick fix solution whereas Japanese would look at a set of long-term holistic solution to any issue.

The management style in the Japanese system is more group-centred and long-term focused whereas Western approach is individualistic and short term based which is quick and definite results oriented. The Kenya system of doing things is largely adapted to the British system. Value management has been slow to catch up and take root in the United Kingdom and so it is in Kenya.

Kaufman (2004) stated that value management was taking deliberate action to improve cost effectiveness. Deliberate action requires education and training, planning, organizational identity and accountability. Value analysts and consultants require this training to be able to practice value management. It can be argued that

there isn't enough or critical mass of trained personnel in the building and construction industry in value management in Kenya. This may not necessarily be the case but coupled with lack of motivation or incentive, the trained personnel may not invest their resources where there may be little gain or outright personal loss and lack of recognition.

3.3 Challenges of Value Management Practice

The public sector has a different set of legal problems as observed by Dunn (1985). This sector, in many cases, uses the concept of procurement where design is separate from the construction. This system is essentially not faulty but it is the opportunity to apply structured value management that may be obstructed by legal hurdles.

Leeuw (2001) notes that governments world over have set treasury cost norms in order to force the building profession into adopting some form of discipline when developing a design. Some of these cost norms are very elaborate and sometimes complex to implement. These norms can sometimes be replaced by structured Value Management. Leeuw also notes that there is a natural tendency for the design team to relax their cost optimization exercise as soon as they find that they are within the set treasury initial cost norms. There is no incentive to proceed beyond that point but value management addresses this problem by it being open ended.

In private commercial development projects, return on the investment has always acted as a yardstick to measure the efficiency of the design. Again the design team may relax their efforts once the accepted return is reached but value management again addresses this problem in a similar manner of being open ended.

Miles (1972) notes that there is no incentive for the consultants to carry out a value management exercise if their fees is based on cost of construction as this would, to the consultants, lead to less fee for more work. Again, no incentive is directed to the contractor to carry out value management for similar reasons. These challenges may be addressed through a share of the savings achieved among the project participants (McGeorge and Palmer, 2002).

The Queensland Code of Practice (2000) identified poor project planning and poor or inconsistent contract documentation as some of the factors that led to cost overruns, quality issues and disputes. To address this challenge the code of practice proposed each party in the project to ensure effective planning through appropriate minimum level of expertise and resource appreciation.

Identification and allocation of risks is another challenge. The tenth – Five year Plan (2002-2007) of the Government of India observed four areas of challenge in the construction industry which inhibit productivity and hence cost performance. They include lack of use of appropriate mechanization to meet the physical challenges in the plan and environment, use of modern technology both at manufacturing of building materials and site construction, use of low technology thus leading to low value addition, low productivity and poor or low quality of constructed facility, leading to time and cost overruns. The fourth challenge is that modernization of equipment and technology is contractor driven unless the client asks and is ready to pay for quality.

Design liability is another challenge. The relevant designer in charge of the proposed Value Engineering Change Proposal (VECP) may not take professional liability arising from failure attributable to design. The designer would need to evaluate the VECP and be compensated for the evaluation before taking any professional liability. This may put strain between the team members especially if seen to be checking other professional colleague's work.

In an article published in Homes Kenya, one of the premier property journals, Odhiambo (2006) writes that innovations are needed in this era of changing technologies and limited revenues because doing things the same old way is becoming a costly mistake. Severe budget shortfalls have forced more private and public institutions to consider alternatives that save time and most importantly money

These are sentiments expressed by persons who are in the business of everyday sale and letting of property. To them sales and letting of property makes their day. But this is not easy when cost of development is high. They have come up with creative project structuring techniques that can reduce construction time lines without adding

the cost. One way of doing this is encouraging tandem phases to be carried out, to commence construction on site as soon as drawings are presented for approval to the local authority. Carrying out presale or letting of property as construction proceeds on site and seeking down-payment from prospective buyers have reduced on borrowed capital. This creative implementation and financing has not only reduced time line but also reduced cost of capital by as much as 30%, (Odhiambo (2006). Construction phase and process is one area that Odhiambo has challenged stake holders to develop and apply these creative innovations. It is such challenges that make the building developers, consultants and contractors in Kenya to go back to the drawing board and find out how best to add value to property development.

3.4 Value Management as a Cost Optimization Tool

The concept of structured Value Management as a cost optimization tool is relatively new world-wide and still growing. The Society of America Value Engineering International, (SAVE International) got their standard first published in 1997 though the SAVE International was formed in 1959. The concept of function analysis is pivotal to value management.

However, it is worthy noting that value is subjective and also changes with time. It is, therefore, necessary to appreciate that there is no real measure of value except to an individual or institution at a given point in time. But we can always achieve value in the definition and evaluation of needs and wants of an item. It is important to differentiate between needs and wants. In value management a function does not only apply to what the project needs but also to what we would like it to do (i.e. wants) (Miles 1972). We always need a roof over our head but we also always do something to keep weather out of our room.

A major problem in the construction industry is to define whose needs and wants in function analysis. The value to the university that produces many graduates is to maintain training leadership in the country. To the student, it is to acquire a university degree, and to the community or society is to have a well educated population. In value management all these subjective and changing values must be considered. It is however not easy to make an assessment of all these needs and wants of all the

stakeholders. To overcome this, value management translates all these to what the user needs and wants the building or facility to do; i.e. the functions that the facility is to achieve. This is not an easy task and requires patience, tact and skill to discern from the multiplicity of conflicting interests of the "true'' function of the building. Then an economical design solution with these functions is provided.

As stated earlier function analysis is the pivot of value management. However, other important components are required for function analysis to operate effectively. These components include alternatives. Choice of alternatives which constitute value management is dependent on many factors such as project, time, scale, design team and business culture of the industry. Flexibility is therefore key to value management as there is no correct or fixed system of value management that cuts across all these variables.

Understanding the component points and best time to use them in value management is vital in the success of value management exercise. But it must always be remembered that value management is not cost reduction. It is a design function or process and any cost reduction is a consequence and not an objective of value management. Queensland Government (2000) Code of Practice puts it as "fit for the purpose"

Value management focuses on achieving design function or process at the optimal cost possible. In Kenya some aspects of value management are practiced through cost planning, cost check, cost control in quantity surveying. However, this is essentially a one-consultant task and more often than not there is no team effort. Information and instruction flow is usually one directional and this defeats value management concept.

3.5 Project Cost Management Systems in Kenya

3.5.1 Cost Control

Ramus (1981) states that cost control is the controlling measures necessary to ensure that the authorised cost of the project is not exceeded. the contract sum is usually the authorised cost limit. The controlling measures are usually in the hands of the architect, engineers and client. The project quantity surveyor's role is usually advisory and therefore not able to exercise the controlling measure, unless the project

quantity surveyor is also appointed as project manager, where he has authority over the architect, engineer and influence on the client. The quantity surveyor's role is therefore reduced to that of monitoring and reporting on costs rather than controlling costs.

Seeley (1978) reports that three themes are important:

a) that design should be a team effort involving new attitudes and relationships;
b) improved design is a learning process based on feedback
c) and cost control including costs in use and should be based on giving client value for money.

The current arrangement of consultancy in Kenya does not encourage team effort. The process of appointment of consultants is as varied as it can be. It ranges from the architect advising on the need to engage other consultants and also appointment of same to where the client appoints members of the consulting team without reference to anybody. The uncoordinated working team must take time before a working mode emerges. Learning from past experience is vital and has been used well in coming up with cost plans that are geared towards client getting value for money. It is the cost check and control that will deliver value for money to the client and this only happens if there is team effort.

3.5.2 Comparative Cost Planning

Comparative cost planning assumes that initial feasibility studies and cost advice determine the general layout and arrangement of the building in light of the total estimated or prescribed cost limits. It then sets out to exercise what the available alternatives in the market are that the designers can use in the design parts, and which are also feasible and acceptable to the client.

The architect considers alternative solutions that are available including their effects on the total design and cost at initial and long term capital outlay. The alternative cost information is set in a manner that enables the architect make rational decisions in accordance with order of costs and their cumulative effects on the total cost. After settling on the design decisions, the architect develops the project design and it is only if any other changes from the design occur that the cost plan is adjusted.

Comparative cost planning method aims at maintaining flexibility of choice of combinations for possible design solutions other than enforcing rigid cost limits for the design. It addresses alternative design possibilities with a total sum of costs. Its objective is not to show how cheaply a building can be produced but to show the spread of cost over various parts of the building and what economies are feasible, (Seeley, 1978).

The findings of Githaiga (2006) research show that quantity surveyors, electrical engineers and mechanical engineers are the main sources of cost estimate taking 100%, 83% and 80% role in that order to generate cost advice and information. Architects take 30%. Seeley (1978), show that architects tend to approach the initial design of a project on physical space requirements and the services engineers are not called upon until very late into design, sometimes until working drawings are completed.

By this time not all the full analysis of environment comfort levels and space required for services may have been made. Allocated budget may not be adequate and this may affect the total cost plan and cost limits initially used to proceed with the project. This state of affairs may give rise to major problems which include cheapening the building, standard of services may be reduced to fit the fixed budget or the client may be asked for additional funds.

Seeley (1978) states that the aims of cost control in a project include give client value for money through a building that is soundly constructed, of satisfactory appearance and capable of performing the function it was put up for. Cost control also aims to achieve a balanced and logical distribution of available resources, between the various parts of the building and to keep the total expenditure of the project within the budget agreed upon at design stage. To achieve this, the quantity surveyor works very closely with the architects and engineers and advices accordingly.

In exercising cost planning techniques the quantity surveyor advices on effects of initial costs and running cost of materials to achieve minimal total cost, investigates

alternative methods of producing the same building at a lower cost; investigates alternative ways where marginal increase in resource utilization would result in returns that are more than proportional to the increased expenditure.

Another task is to investigate methods of using the same resources to produce a different investment which may give better returns. This includes identifying location and appropriate investment of the same resources of mutually exclusive projects. Value management emphasises team effort to achieve optimal cost optimisation.

3.5.3 Tendering Arrangement

Seeley (1978), states that conventional or traditional methods of tendering have been criticized on the grounds that they fail to take full advantage of modern techniques. In 1965 a working party was established by the Economic Development Committee of the United Kingdom and one of the recommendations was to get the main contractor join the design team at an early stage. This recommendation was based on the backdrop that the contractor may have alternative ideas on materials and techniques that would be beneficial to the project.

The various tendering procedures in Kenya include cost plus contracts, target cost contract, contracts based on drawings and specifications, package deal contracts and measuring and value contracts. The two most common methods in Kenya are contracts based on drawings and specifications and measure and value contracts based on bills of quantities, commonly referred to as the traditional method. Drawings and specification contracts puts the onus on the contractor to construct and complete the works on a fixed lump-sum. The client does not pay anything extra unless it arises from agreed variations. It is up to the contractor to see how best to complete the project within the lump-sum. This puts a lot of pressure on the contractor to make some profits and any accruing benefits is not passed on to the clients. On the other hand any losses made on the project are borne by the contractor.

The "measure and value" contract is the most popular method of contract procurement in Kenya. It is perpetuated by the concept of competitive bidding or tendering and improved relationships between contractor and client. It incorporates good cost control and cost checks systems. However, Seeley (1978) observed that the Institute

of Building (1971), noted that this system inhibits communication between the different functions involved in the building project. The current practice is for the contractor to build and complete the works as designed and his alternative input is not required thus shutting out any benefits that would accrue from the contractor's alternative input. It also inhibits alternative proposals from other team members though working on the same project.

One of the key components of all these contract procurement methods practiced in Kenya is cost planning. Cost planning can be defined as controlling the costs of a project within a predetermined sum during the design stage. It includes a cost plan and carrying out cost checks. Effective cost plan/checking therefore requires personnel who are well trained, versed with up to date information of materials, components and technologies to be able to advice the design team and control cost during construction period.

A good cost plan involves cost analysis, approximate estimating, cost research, cost study, cost-in-use, cost control and building economics. Single unit price system of cost estimating and planning however has inherent weakness (Ferry, 1978). The weaknesses include inability to trace cost variance to any design parameter when detailed cost estimate is carried out and this can only be done after substantial design work has been done.

A closer look at the above theory of cost control and contract procurement method reveals an over emphasis of performance by one member of the design team, namely, the quantity surveyor or cost engineer. It is not team work, the input of the cost expert relies heavy on the goodwill of the rest of the team members, client and contractor and any slight disregard may render the whole cost plan and control useless.

Another observation is that the cost expert is supposed to be an encyclopaedia of information and therefore only useful when consulted and not to offer unsolicited information. The same encyclopaedia is supposed to research, keep track and store information and his would happen at high costs. The current situation in Kenya is where fees is being competed for and therefore, together with the other members of

the consultancy team, the fees is substantially reduced making it difficult to research, store, retrieve and disseminate information to the client who is unwilling to pay for the services.

Ramus (1981) argues that choice of which method of contract to be used depends on varying circumstances. This varies from, lack of time to design, tender and commence works on site, past relations of contractor and client, size of the project (small projects may be tendered on drawings and schedule of rates) and purpose for the contract e.g. maintenance contracts are best tendered on schedule of rates. However in all these arrangements the value management aspect is not part of the consultancy. There is no team effort.

In an ideal situation the consultancy team would pool their resources in brain storming sessions and carry out positive critic of the design with a view to saving costs for the good of the project but with commensurate compensation from the developer. It is expensive to train, retain and disseminate information or expertise without pay. A similar compensation arrangement does not exist for the contractor.

3.6 The Study Conceptual Model

The concept of Value Management in the building and construction sector can be defined as adding value to a product or built facility through conscious action that would enhance function, cost, time, performance and quality. There are many independent variables that add value but their impact is varied. There are those with high impact and those of low impact. The total sum of all independent variables that enhance value can be expressed by the following conceptual model. It was beyond the scope of this research to address all these independent variables. The study addressed only variable X_2 the one that, for this research, had major impact on value addition.

$$C = [f(x_1) + f(x_2) + f(x_3) + f(x_4) + \ldots\ldots\ldots\ldots + f(x_n)]$$

Source: Researcher (2009)

Value addition can be defined as;

$C = [f(x_1) + f(x_2) + f(x_3) + \text{--------} + f(x_n)]$

where,

C	=	Value addition or cost optimization as a result of Value Management
X_1	=	discretion of the design team to implement partially or fully proposition put forward by fellow professional colleagues
X_2	=	Use function as met by the proposals from project team.
X_3	=	Aesthetic function as met by the designer requirements.
X_n	=	The last independent variable that determine teams ability to optimize costs.

All these variables play an important role in determining the effectiveness of the Value Management team to add value. Variable X_2 is very fundamental in value management and this is the variable that was subject of this research.

The bottom-line of the customer is to get function from the product or service function in a *use* function or *aesthetic* function. Function for use entails some actions to be performed and aesthetic function is met by the satisfaction or pleasure. Therefore all costs should be towards achieving these. Many products require both use and aesthetic functions but to varying degrees, for example, the form or shape of a building has basically the aesthetics function. Steel reinforcement in reinforced concrete has use function only whereas the decorations on a Banks main entrance LAMU door have basically aesthetic function. These examples show that intense concentration of mental work and searching is required to unearth unexpected steps of advancement of value in the product or service.

In order to proceed with planned value work successfully it was important to clearly identify, clarify and name functions. One must fully identify what the client wants out of the product or the service. To be able to achieve this, Miles, (1972), writes that it is mandatory to state the function in exact sentence; for example

- Is that exactly what it does for the customer
- Is that exactly what the customer wants it to do
- Is that exactly what the customer believes he is paying for?

The process of identifying, clarifying and naming is tedious. To improve on this until the exact function is established, the functions must be expressed in a verb and a noun only, two words only. Miles (1972) wrote that if not so then the basic function has not been fully understood.

As far as possible it is prudent to quantify function. This would be possible by defining function in quantifiable terms, for example to "increase teaching" may be defined as "increase capacity". This can be quantified by stating what capacity i.e. number of students in a classroom. This results in unifying function unit and specification which can then be priced allowing and ascertaining worth or cost of the function under any specification or constraints. After functions are identified, classified, understood and named they are further classified as basic or secondary functions. Basic functions are those that make a customer buy the item or service. Secondary functions are those functions required to cause the designer's choice of means for accomplishing the basic function; the basic function to perform effectively. Value must be quantified. Kaufmann, (2004), expresses value by the formula,

$$\text{Value} = \frac{\text{Function}}{\text{Cost}}$$

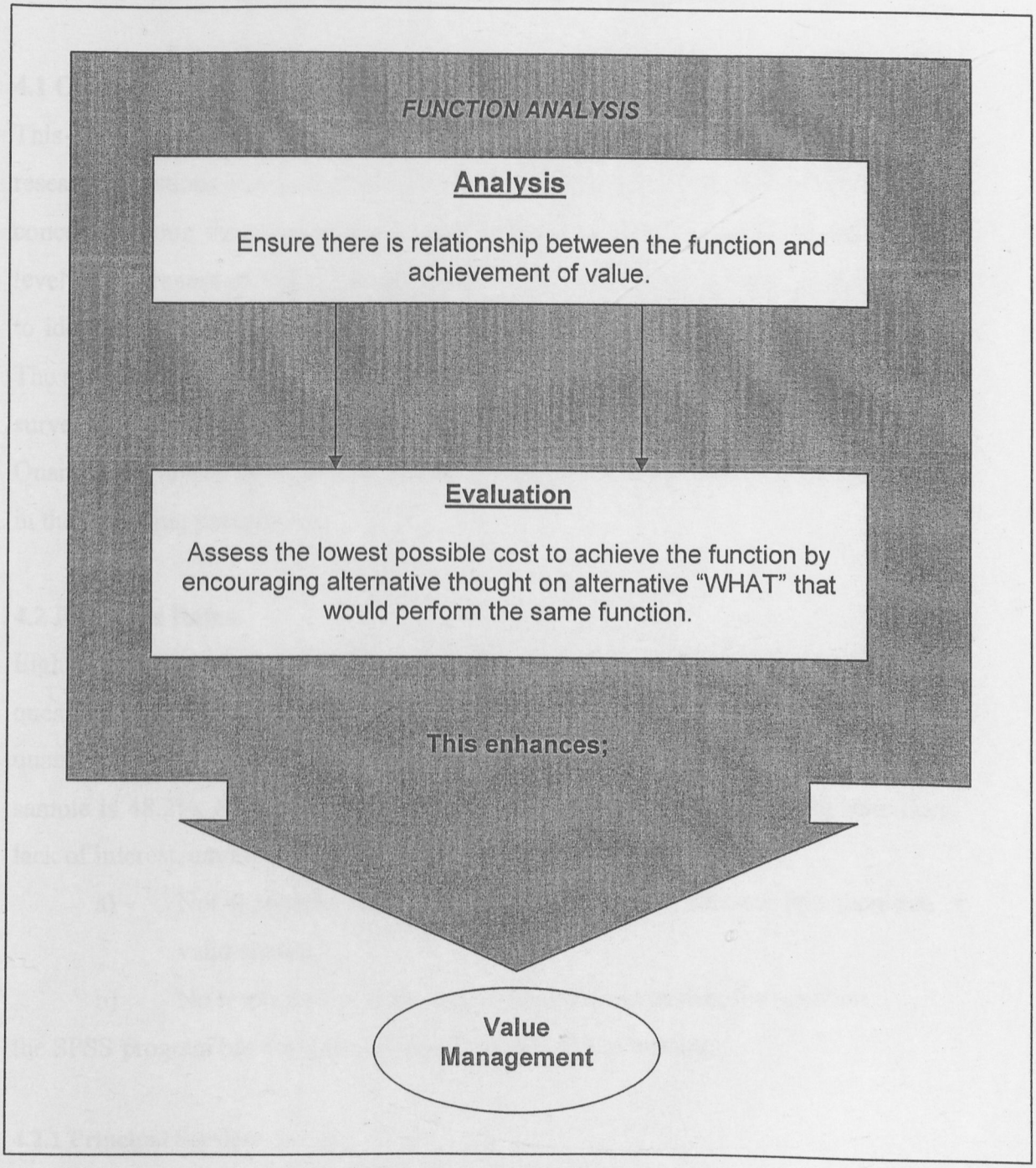
Where;

Function = the cost of meeting the function required

Cost = the lowest total cost to meet the basic function

The main thrust of value management would be to expand the role of the design team and approach to consultancy where non-design team stakeholders participate at the appropriate time in the design and implementation of the project. To achieve this, the client must first appreciate the role and benefits of value management. The second is for the consultancy team to actively encourage, participate and implement value management; the third stage is for the client to implement the resultants. Miles (1972) describes the two basic areas of opportunity where better value may be obtained. They include first, the identification of costs as unnecessary and second, to make the decision to remove the identified unnecessary costs. The findings of Githaiga (2006) showed that it is important for professionals in the building industry to evaluate management techniques as they have a bearing in the cost of building.

Figure 3 - Graphic representation of function analysis and Evaluation



Source: Adapted From McGeorge and Palmer (2002)

3.7 Summary

Related literature has been reviewed and addressing more on the concepts, theory, practice and experiences in this country and elsewhere. The next chapter looks into the methodology of how data was collected and analyzed.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Overview

This study had the following study objectives that were used to operationalise the research questions viz; to explore the level of application of the Value Management concepts among the construction industry stakeholders in Kenya; to investigate the level of awareness of Value Management in the construction industry in Kenya; and to identify the challenges that face the application of Value Management in Kenya. The stakeholders are diverse and the research was restricted to architects and quantity surveying firms that were duly registered by Board of Registration of Architects and Quantity Surveyors as on 13th June, 2008. The data collected and analysis is presented in the following paragraphs.

4.2 Response Rates

Eighty three questionnaires were administered to the sample firms. Out of the 53 questionnaires sent to architects 17, which is 32% response rate were returned; and 23 quantity surveyors responded out of 30, making 76.7%. Response rate for the total sample is 48.2%. Reasons for non-response include busy schedules, long time lines, lack of interest, among others. Two notable responses are;

a) Not applicable - this was one of the option answer and therefore a valid answer

b) No response - some respondents did not answer the question

the SPSS program has categorised these two answers as missing.

4.2.1 Principal Services

The researcher started by ascertaining the principal services offered by the respondents, which are as shown in table 4.1 below. It was necessary to find out from the outset if there is any firm that offers value management as one of its separate services. None of the respondents offers value management as a separate service.

Table 4.1: Full range of services offered by your firm

	Services	N	Percent
i.	Architectural Consultancy Services	17	23.6%
ii.	Interior Design/Design	7	9.7%
iii.	Environmental Design	3	4.2%
iv.	Quantity Surveying/Building Economist	36	32%
v.	Project Management	16	22.2%
vi.	Arbitration	3	4.2%
vii.	Planner	1	1.4%
viii.	Urban design	1	1.4%
	Total	**72**	**100.0%**

Source: Fieldwork, 2009

4.2.2 Firm's Capacity and construction Project Managers

There is strength in numbers. It was necessary to find out how many professional staff; directors, partners and employees were in the firm because this reflects capacity to offer diverse services including value management over and above the usual architectural or quantity surveying services. Out of the sampled firms only 16.7% of architectural firms and 48.1% of quantity surveying firms have more than two professionals in the firm. This has a direct implication on a firm's capacity to deliver adequately in diverse fronts. This reduces their capacity to diversify into services other than mainstream architecture and quantity surveying.

The study collected data on employment of construction managers in architectural and quantity surveying firms. Out of the 40 questionnaires received 21 did not respond to this question. The analysis is therefore restricted to the valid responses only. Out of the valid responses, 63.2% of respondents do not have a construction project management graduate in their employment. These are university graduates who have a basic training in value management *(see table 4.2)*;

Table 4.2: Construction Project Management Professionals in the firm.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	12	30.0	63.2	63.2
	One	2	5.0	10.5	73.7
	Two	3	7.5	15.8	89.5
	More than 2	2	5.0	10.5	100.0
	Total	19	47.5	100.0	
Missing	No Response	21	52.5		
Total		40	100.0		

Source: Fieldwork, 2009

4.3 The Extent of Application of Value Management

4.3.1 Pre-Contract Stage:

It can be argued that the success of delivery process of a built-facility would not be complete without active participation of stakeholders. The more inclusive the team is, the more likely that critical success factors of the project would be addressed. For purposes of this research, critical success factors were addressed through use and aesthetic functions from the point of view of the developer only. Therefore in assessing stakeholder composition during design and construction stages, the following was observed *(see tables 4.3 below)*;

Table 4.3: Stakeholder Composition

No.	Project Team Composition	Design Team Composition	Number	Percent
1	Client, Users, Consultants & Contractors	Architects, Quantity Surveyors, Service Engineers, Structural/Civil Engineers	18	72%
2	Client, Consultants & Contractors	Architects, Quantity Surveyors, Service Engineers, Structural/Civil Engineers	5	20%
3	Consultants	Architects, Quantity Surveyors, Service Engineers, Structural/Civil Engineers	1	4%
4	None	Architects	1	4%
Total			**25**	**100%**

Source: Fieldwork, 2009

From the table above, the composition of project and design team in row No. 1 was the most predominant and took about 72% of all the responses. In deed this is the ideal to inform the project from design to construction and disposal stages. The most sacrificed team member according to the findings of the study is the Users. By ignoring the user, a project risked being labelled non-user friendly since the users did not participate in the development and realization of the project.

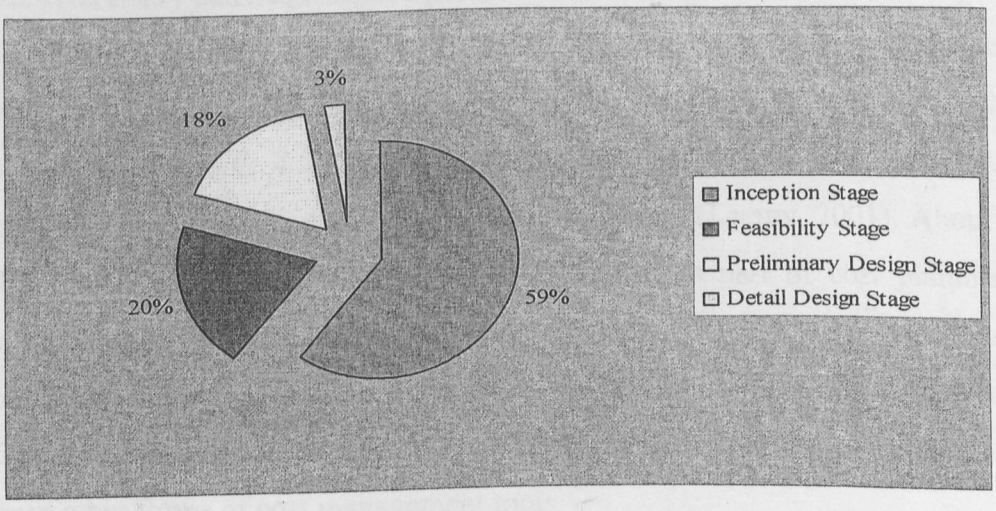
From the study, only 20% of the consultants consulted users of the proposed built facility. It must be made clear that the developer is not necessarily the user. For this study the developer is the person or institution that pays for the construction and the users are those who work, visit or are served in the built facility. The developer in a hospital would be the Medical Officer of Health in charge of the hospital; the users are the doctors, nurses, support, suppliers and patients who work and are served in the built facility.

The use function success factors include physical size of rooms, circulation and relevant privacy attendant to each patient throughout the consultation and treatment process. The aesthetic function success factors increase appeal of the design, appropriate colour schemes, workmanship, landscape, etc.

4.3.2 Point of Appointment

Early appointment of all consultants in a project increases both chances of application of Value Management and the resultant benefits. The study showed that about 59% of the respondents were appointed early, at inception stage.

Figure 4: Firm's appointment



Source: Fieldwork, 2009

4.3.3 Services Developer Commissioned the Consultants for

Whereas the questionnaire asked the respondents to state the services they offer, the respondents were also asked to state what services their clients requested for. Although it was beyond the scope of this research, it was necessary to explore the level of awareness of developers and so assess if there is demand for value management services in the first place.

Table 4.4 Consultancy services the developers commissioned the consultant for.

	Services	N	Percent
1	Normal Architectural/Quantity Surveying services as per CAP 525	39	84.78
2	Value Management Services	2	4.35
3	Others	5	10.87
4	**Total**	**46**	**100**

Source: Fieldwork, 2009

It was found that 4.3% of the respondents were requested to offer Value Management services. Project Management and Turn-Key services attracted 16.7% of respondents each. Other services requested for include development consultancy, structural, civil, mechanical and electrical engineering, project management and turn-key services. The 4.3% of services requested by clients suggest a low level of awareness and hence low demand for value management services. This poses a challenge to the professionals to learn, promote and apply value management.

4.3.4 Necessary and Sequential Aspects of Value Management

The study also intended to bring out exactly and with clarity the necessary and sequential aspects of value management that were carried out, if at all, by the consultant *(see table 4.5 below).* It emerged that some aspects of value management may have been practiced but in an unstructured way, (Leeuw, 2001). About 51.3% of the respondents carried out these aspects though as part of cost planning or cost reduction exercise. A similar percentage of respondents did preliminary designs and cost plans. They however did not carry out further cost optimization exercise after fitting within the budget. This is one major point of departure of value management from other forms of cost management tools.

Table 4.5: Client provided a budget at briefing stage

Variables		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	50.0	51.3	51.3
	No	19	47.5	48.7	100.0
	Total	39	97.5	100.0	
Missing	No Response	1	2.5		
Total		40	100.0		

Source: Fieldwork, 2009

4.3.5 Phases of Value Management

It was necessary to explore what phases of value management may have been applied in a structured or unstructured way. This is because it came out strongly in the literature review that some aspects of value management may be practiced in the cause of managing projects and the following was observed *(see table 4.6 below).*

The respondents overwhelmingly confirmed to have performed the various phases of value management. It is not forgotten that it is only 4.3% of respondents who were commissioned to provide value management services yet this not what they were commissioned for. Other observations include information on fixed decisions, analysis of functions of the project, elements and components. Cost optimisation of the significant elements and components of the project. The consultants also prepared alternative proposal which were appraised, ranked, and presented to client for implementation.

4.3.6 High Impact Intervention Points

The Pareto principle states that 80% of the costs of a project are comprised of 20% of the inputs. It may not be economically viable; to analyze all sections of the works. The study investigated whether this principle was applied and 57.9% responded they identified high impact items or areas for further cost reduction or optimization.

Table 4.6: Application of phases of Value Management

Variables	Frequency		% Response	
	Yes	No	Yes	No
Did the developer provide written notes to inform the team about the project, rationale, planning and preliminary work already done?	15	24	38.5	61.5
Did the developer explain and justify to the team the project and any fixed decisions that may have been made?	23	16	59.0	41.0
Were the function aspects of the project, space, element and components thoroughly analyzed at different times?	30	9	76.9	23.1
Were areas where significant cost optimization could be achieved identified?	30	9	76.9	23.1
Was a detailed assessment of all ideas generated carried out to come up with alternative proposals?	22	16	57.9	42.1
Were the alternative proposals further evaluated by the Design Team or Consultants to select the optimal one?	24	15	61.5	38.5
Final recommendations were presented to the developer for implementation.	32	7	82.1	17.9

Source: Fieldwork, 2009

4.3.7 High Impact Intervention Points

The Pareto principle states that 80% of the costs of a project are comprised of 20% of the inputs. It may not be economically viable; to analyze all sections of the works. The study investigated whether this principle was applied and 57.9% responded they identified high impact items or areas for further cost reduction or optimization.

Table 4.7: Identification of high impact items or areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	55.0	57.9	57.9
	No	16	40.0	42.1	100.0
	Total	38	95.0	100.0	
Missing	No Response	2	5.0		
Total		40	100.0		

Source: Fieldwork, 2009

4.3.8 Function Analysis

Function analysis is a key aspect of value management. The study enquired about this key component and the following emerged. 81.6% identified and defined basic function, 73.7% evaluated the function, 63.2% generated alternatives that could achieve the same function and 83.3% said the design team prepared scheme designs and related cost plans. The answers to these questions are not consistent with the demand for value management as discussed earlier. (See table 4.8). However, they tend to support observation that value management has been practiced before but without any structure.

Table 4.8: Function Analysis

	Variables	Frequencies		% Response	
		Yes	No	Yes	No
1	Identify and define basic function?	31	7	81.6	18.4
2	Evaluate the function?	28	10	73.7	26.3
3	Generate alternatives that could achieve the same function?	24	14	63.2	36.8
4	Design team prepared scheme designs and related cost plans.	20	4	83.3	16.7

Source: Fieldwork, 2009

In order to achieve maximum benefits on value management or cost planning, functional analysis must be done early. While in trying to find out at what stages function analysis may have been applied and therefore yield maximum benefits, it was observed that 61.7% carried out cost planning at preliminary stage.

Early application of any cost management system is essential to achieve maximum value benefits in the project. Cost planning is a key component of current cost management systems being practiced in Kenya today. Traditional contract

procurement method is the most common in Kenya building industry where design is separated from construction.

4.3.9 Project Level

4.3.9.1 Inception/Feasibility Level

The researched investigated whether or not very early involvement and hence application of value management would change the developer's decision (see table 4.9). 51.3% responded YES and 48.7% responded NO. Whereas value engineering and management may not claim full credit, it is clear that early consultation may yield economical decisions. These decisions include change in timing, type, size, location and target market of the project.

Table 4.9: Change of brief as a result of Value Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	50.0	51.3	51.3
	No	19	47.5	48.7	100.0
	Total	39	97.5	100.0	
Missing	No Response	1	2.5		
Total		40	100.0		

Source: Fieldwork, 2009

4.3.9.2 Preliminary Design

In order to find out whether value management was applied beyond fitting into the budget at preliminary stage, 92.5% responded that at preliminary design stage, they prepared initial cost estimate while 7.5% said they didn't. As a prelude to further

Table 4.10: Prepared Initial cost estimate at Preliminary design stage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	37	92.5	92.5	92.5
	No	3	7.5	7.5	100.0
	Total	40	100.0	100.0	

Source: Fieldwork, 2009

application of value analysis it was noted that 50% of respondents claimed that the developer had provided a budget at briefing stage, 43.6% responded that they were within budget at preliminary stage and did not carry out any further cost reduction or optimization thereafter. After carrying out a preliminary cost estimate and fitting within the budget, the study noted, on further interrogation, that only 33.3% respondents explained why they did further alternatives and corresponding cost estimates.

Table 4.11: If YES - Cost estimate within the budget

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	42.5	43.6	43.6
	No	13	32.5	33.3	76.9
	No Budget	9	22.5	23.1	100.0
	Total	39	97.5	100.0	
Missing	No Response	1	2.5		
Total		40	100.0		

Source: Fieldwork, 2009

Out of the 33.3%, only 7.7% cited cost benefit analysis as the driving factor. Another 7.7% cited change in material supply system. The ever increasing prices of inputs had compelled most developers to seek alternative sources or types of material and this has set stage for further research and application of value management in the building industry in Kenya. For those who responded "NO" they all stuck with their original idea and budget. It was also noted that a total of 52.5% did not respond either way. Value management goes beyond fitting within the budget.

4.3.9.3 Detailed Design Stage

At detailed design stage, see table 4.12 it is clear about most design parameters, intended quality of finished product and specifications. To investigate about the application of value management beyond fitting within the budget at detailed design stage, 82.5% of the respondents said that they carried out a cost check before

tendering and that, according to 75.7% of the respondents, the detailed cost estimate was still within the preliminary budget. No further action was taken after this stage on cost optimization. One of the pit falls of value management is the trappings of ever changing design proposals which might bog down the design process of the project (McGeorge and Palmer, 2002). The project team must therefore guard against this tendency and move on.

Table 4.12: Detailed Design Stage

Variables	Frequencies		Response	
	Yes	No	Yes	No
At detail Design it is clear about most design parameters, intended quality of finished product and specifications. Did you carry out a cost check before tender?	33	7	82.5	17.5
Was the detailed cost estimate still within the preliminary budget?	9	28	75.7	24.3

Source: Fieldwork, 2009

The study also enquired about value management aimed at improving quality and time. 40% said yes whereas 60% said No to improvement of costs. 50% made effort towards improvement of quality and only 30% attempted to improve on time. *(see table 4.13 below).*

4.3.9.4 Consistency of Responses

It was necessary to check consistency of the responses, (Leedy, 1980). In order to test the application of methods used by the respondents in their stated practice of value

Table 4.13: Alternative proposals made

	Frequencies		Responses	
Variables	Yes	No	Yes	No
i. Improvement of cost	16	24	40%	60%
ii. Improvement of quality	20	20	50%	50%
iii. Improvement of time	12	28	30%	70%

Source: Fieldwork, 2009

management, it was observed that 55.6% met with users whereas 22.2% did not carry out any value management exercise. Another 22.2% held a working retreat away from usual offices and had carried out some form of value management process aimed at reducing cost, improve quality and realizing the project earlier. 32.5% of the respondents did not answer this question. It is not forgotten that only 4.3% respondents were asked to provide value management services by their clients. This observation reinforces earlier one that some aspects of value management are carried out under various cost management methods applied in building projects.

Table 4.14: How alternatives were arrived at.

Variables		Responses		Percent of Cases
		N	Percent	N
g(a)	None	6	22.2%	30.0%
	Design team met with users and customers for a design critic	14	51.9%	70.0%
	External team and facilitators were invited for design critic in the client's/consultant's office	1	3.7%	5.0%
	Team held a working retreat away from office with facilitators	6	22.2%	30.0%
Total		27	100.0%	135.0%

Source: Fieldwork, 2009

4.3.9.5 Pricing the Value Management Exercise

Cost of value management exercise must be justified by the benefits accruing, be they monetary or otherwise. McGeorge and Palmer (2002) do not essentially reject the concept of pricing the value management exercise. It is necessary that the value management exercise be priced to find out if the costs of the exercise can be justified by the realized savings. It was found that only 25% of the respondents priced the cost of value management.

Another purpose of pricing the value management exercise is for the developer to appreciate and comprehend what the consultants' effort is worth through return on investment computations. It will form a basis for establishing terms and conditions of establishing a discipline of consultancy and remuneration separate or independent from the current ones in Kenya *(See table 4.15 below)*

Table 4.15 Showing whether the cost of the retreat and fees were priced

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	2.5	25	25
	No	3	7.5	75	100
	Total	4	10	100	
Missing	N/A	35	87.5		
	No Response	1	2.5		
	Total	36	90		
Total		40	100		

Source: Fieldwork, 2009

4.3.9.5 Effectiveness of the Value Management Applied

In order to find out about effectiveness of the value management applied, 25% responded achieving savings less than 5%, while 75% responded achieving savings of between 5% and 10%. Based on CAP 525 Laws of Kenya, the consultants' fees for a KShs. 20million project would be KShs. 2.4 million to 3.0million at the rate of 12% to 15% including engineering fees. In such a project, a saving of 5% would translate to a saving of Kenya Shillings One Million, which is about 42% of the consultants' fee for other conventional services. It can be deduced that value management is a self financing exercise when applied properly. It is this that needs to be sold to potential and current property developers and investors.

From the data, 88.9% of the respondents acknowledged that the savings are worth the effort and in trying to find out about the enthusiasm of application of value management, 90.9% responded they would repeat the same exercise in their next project. However, these two categories are only 20% and 25% of the total

respondents. The majority of respondents had not applied value management in their projects and therefore made an N/A (not applicable) entry in the questionnaire. The important thing is that a seed of encouragement has been sown in those consultants who responded yes.

Table 4.16: Percentage savings attributable to the function analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5%	2	5.0	25.0	25.0
	5% to 10%	6	15.0	75.0	100.0
	Total	8	20.0	100.0	
Missing	N/A	31	77.5		
	No Response	1	2.5		
	Total	32	80.0		
Total		40	100.0		

Source: Fieldwork, 2009

In order to find out about the main focus of value management for the sample project, it was observed that 20% of the respondents used alternative construction processes to improve on time performance, 66.7% used alternative materials but of equivalent quality to improve on cost performance and 40% looked at life cycle costs of alternative materials.

Table 4.17: Alternative process of construction to improve time performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	2.5	20.0	20.0
	No	4	10.0	80.0	100.0
	Total	5	12.5	100.0	
Missing	N/A	32	80.0		
	No Response	3	7.5		
	Total	35	87.5		
Total		40	100.0		

Source: Fieldwork, 2009

4.3.10 Post Contract Stage

4.3.10.1 Fixed Decisions and Costs

To investigate whether or not there were any decisions that had been made by the client that could not be changed, yet there probably was a better or cheaper alternative, 64.1% of the respondents said there were some fixed or locked-in decisions. These are some of the issues that are supposed to be addressed by value management, to increase value by way of reviewing decisions and corresponding costs that do not add value to the built facility.

The study investigated to whom these fixed decisions could be attributed to; the developer took up to 100% share, the maximum for consultants being 70% and contractor taking 5%. Users took the least share. This leads to a suggestion that users are least consulted and involved in the design and development process of the project. However it is the users who bear the brunt when the built facility fails in one way or another, yet they were most likely not consulted. The study also investigated what steps the consultants took. Again, to authenticate whether the respondents bothered to do any comparative cost analysis of fixed decisions against alternatives, 54.2% of respondents said they priced the alternatives though they may not have been implemented. The decisions had been fixed.

4.3.10.2 Contract Procurement Methods and Timing

Muriithi (2006) observed that methods of contract procurement have an influence on the project performance. To investigate whether or not alternative contract procurement methods were considered and their influence on application of value management, 47.5% of the respondent considered alternative methods of contract procurement. 80% of these respondents opted for traditional method compared to 20% who used contemporary method of contract procurement in the sampled projects. No reason was given for choosing traditional method apart from being the traditional one.

In finding out whether the method of contract procurement used was the best, 72.5% still thought that the traditional method of contract procurement was the best for the sample project studied. Findings of research study by (Muriithi, 2006) indicate that contemporary methods of contract procurement are not very clear to the respondents.

For those who chose contemporary contract procurement method, 83.3%, stated single sourcing as the contract procurement method of choice.

To achieve maximum benefits and results it is always best to involve the project team as early as possible. The team would make proposals to be incorporated in the works as the project design develops and progresses on. In finding out at which point the contractor was appointed if indeed contemporary method was used and hence achieving best Value Management input from the contractor, 33.3% of the respondents said the contractor was appointed at sketch design stage.

Dunn (1985) applied value management at 40% through design stage on negotiated contracts. The traditional method of contract procurement has its limitations on application of value engineering techniques. The contractor's input comes in too late after the designs have been completed. This brings in resistance to changes and new proposals because the design team would have finished their design work. It may also contribute to delays in the intervening period to redesign, evaluate and get requisite approvals from the developer. It may also contribute to additional costs that may arise from demolition of already built work.

Table 4.18: Appointment of contractor for contemporary contract procurement methods

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sketch Design	2	5.0	33.3	33.3
	Detail Design	1	2.5	16.7	50.0
	Design and build	3	7.5	50.0	100.0
	Total	6	15.0	100.0	
Missing	N/A	33	82.5		
	No Response	1	2.5		
	Total	34	85.0		
Total		40	100.0		

Source: Fieldwork, 2009

4.3.10.3 Construction Stage

The contractor would be expected to make contributions, suggestions and opinions on the design and construction methodology. During the study it was found that 37.5% of

the respondents recorded that the contractor made proposals that were incorporated in the project. This does not reflect well on the tapping of contractors' knowledge and experience in building projects.

In finding out about change in contract price upwards or downwards the following was noted. 22.2% registered savings and 77.8% registered cost overruns. It must be remembered that increase in price does not necessarily mean cost overrun. In value management, the increase in initial cost may be as a result of life cycle costing requiring higher initial costs and save on future cost.

Cost savings were explained through fixed lump-sum contract, cost control and planning, use of alternative materials and construction techniques. Cost *overruns* were explained as arising from variations, unforeseen site conditions, phased out contract programme, delays in procurement of equipment, delay in remittance of funds, currency fluctuations for foreign funded projects and variations arising from functional inefficiency of design. Functional inefficiency of design was attributed to lack of appreciation of inputs from fellow project team members.

4.3.10.4 Value Management on Final Quality of the Sample Project

The study investigated the impact of value management on final quality of the sample

Table 4.19: Final quality of the built facility compared to inception / preliminary design level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Higher	18	45.0	47.4	47.4
	Lower	3	7.5	7.9	55.3
	Same	17	42.5	44.7	100.0
	Total	38	95.0	100.0	
Missing	N/A	1	2.5		
	No Response	1	2.5		
	Total	2	5.0		
Total		40	100.0		

Source: Fieldwork, 2009

project and 47.4% of the respondents were of the opinion that the quality was higher than initially designed, See table 4.19. The study asked whether or not, in their opinion, the final cost of the project could have changed if the contractor's change proposals were not incorporated in the works. 43.8% of the respondents reported that the cost of the project would have changed one way or the other. Whereas this is true for any project it is those changes that are attributable to value engineering and management that were being sought.

4.3.10.5 Compensation for Services

Effort needs to be compensated for *(see Table 4.20)*. On enquiry about compensation of the contractors' effort the study found that in 66.7% times, the contractor was not compensated for his value engineering input. Compensation for value engineering must be distinguished from payment for work done. It is the intellectual expertise or knowledge from the contactor that compensation is required. The contractor was paid for work done, but any expertise knowledge was not compensated for. Lack of compensation discourages application of value engineering and management because the contractor may lose both profits on turnover and effort.

Table 4.20: Compensation for the effort above normal engagement

Variables	*Frequency*		*% Response*	
	Yes	No	Yes	No
In your opinion if the contractor's change proposals were not incorporated in the works would the final cost of the project have changed?	7	9	43.8	56.3
If yes to the above question, was the contractor compensated for his input?	4	8	33.3	66.7
Were you compensated for all your efforts above the normal engagement?	6	28	17.6	82.4

Source: Fieldwork, 2009

Similarly, the study investigated about compensation of the consultants' efforts in the value management exercise, 82.4% of the respondents were not compensated for their efforts over and above the normal architectural and quantity surveying consultancy

engagement. Lack of compensation is even more severe for consultants than for contractors.

Lack of recognition and appreciation of effort made by both contractor and consultants has been a hindrance to practice of value management. This discourages both contractors and consultants to invest their resources where they may not bear fruit. It can also be argued that where fee is based on a percentage of cost, it may be seen to go against the grain to reduce the total cost of the project through value management techniques for consultants. The same can be said of contractors whose profit is related to the volume of works carried out.

4.3.10.6 Cost, Time and Quality Functions Performance

The study endeavoured to find out the consultants' perception of the project after successful completion. The respondents were asked to re-look at the project under study and reflect on their hind sight perception about it. A critical re-look would reveal areas that the respondents may have wanted to change or maintain, be it in construction process, design or material and contract procurement, all viewed through end results of the project. Up to this point, the direct question on awareness of value management had not been posed to the respondents. The next section deals with direct knowledge and application of value management techniques.

4.4 The Extent of Awareness of Value Management

The second research question was to investigate level of awareness of value management in the building Industry in Kenya. This study restricted the investigation to architects and quantity surveyors only to make it manageable within time and resources available. They are also at the forefront of applying value management in the projects they handle. The study found that 59 % of respondents were aware and out of these, 32% are formally trained, 40% have learnt it on the job and general reading. This response relate with earlier responses on application of value management. It was necessary to re-confirm that the responses were in line with expected behaviour of those who know and practice value management formally.

Table 4.21: Awareness of value management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	57.5	59.0	59.0
	No	16	40.0	41.0	100.0
	Total	39	97.5	100.0	
Missing	No Response	1	2.5		
Total		40	100.0		

Source: Researcher 2009

Table 4.22 *Mode of becoming aware of value management*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Formal Training	8	20.0	36.4	36.4
	On the job Training	9	22.5	40.9	77.3
	Others	5	12.5	22.7	100.0
	Total	22	55.0	100.0	
Missing	N/A	16	40.0		
	No Response	2	5.0		
	Total	18	45.0		
Total		40	100.0		

Source: Researcher 2009

From these tables it is apparent that the level of awareness is low. 20% of the respondents are formally trained and another 22.5% have learnt on the job. But when reflected against those who practice value management that is where the problem lies. It is the structured practice of value management that is really low as was observed in the next table.

4.4.1 Awareness, Public or Private, Application and Benefits

The main reality that this study brought out is that, the level of awareness is low and the level of application is even lower. This reflects the lack of formal practice of value management and the haphazard or little practice is more of incidental rather than formal application. To be able to think of applying value management, one has

to be trained and aware about the accruing benefits. The test is to find out what it is that value management offers beyond other methods of cost management. No wonder only 33.33% of respondents think there are any benefits!

Table 4.23: Awareness of value management and the project handled: Cross-tabulation

		The project is		Total
		Public	Private	Public
Are you aware of value management?	Yes	6	17	23
	No	4	12	16
Total		10	29	39

Source: Researcher 2009

All the respondents were consultants in the private sector. As mentioned earlier, 25% of the sample projects were public but handled by the private consultants. The study investigated this to establish the extent of distribution of application in public and private sector. The analysed data show that six public sector projects, which is only 15% of the sample size, were handled by consultants who are aware of value engineering. Seventeen were private sector projects that were handled by consultants who are formally trained in value management. Further analysis showed that only three public and six private firms applied value management in their projects. This is only 22.5% of all the respondents whereas the extent of awareness is at 27.5%. Reasons for low application are detailed in Table 4.27 below

4.4.2 Homogeneous Awareness

The study found that 20% of the architects and 35% of the quantity surveyors are aware about value management through formal training. This shows a lack of homogeneous awareness thus creating a bottle neck in the application system. This one of the reasons cited by the respondents that hinders application of value management. This is only 27.5% of the sample. Presence of construction project managers has not been fully exploited and perhaps their full potential has not been realized. They have basic formal training in value management and they would be useful in its application.

Table 4.24: Applied value management was there any advantage* The project is * Any cost overruns or savings for the project: Cross-tabulation*

Were there cost overruns or savings for the project?			The project is		Total
			Public	Private	Public
Savings	In the project that you applied value management, was there any advantage over alternative methods of cost management that would have been employed?	Yes	0	2	2
		No	1	1	2
		Not Applied	1	1	2
	Total		2	4	6
Over-run	In the project that you applied value management, was there any advantage over alternative methods of cost management that would have been employed?	Yes	2	3	5
		No	1	0	1
		Not Applied	2	7	9
	Total		5	10	15

Source: Researcher 2009

It is not enough to have learnt value management; one must apply it, and to be able to apply, there must be an enabling environment. This environment includes there being a need and demand for the service. Demand must be effective. Effective demand is demand that is backed by purchasing power. The source of the demand must therefore be willing and able to pay for the service. For the enabling environment to work, the necessary steps, tools and sequence must be followed.

The process of structured function analysis requires that a series of sequential steps or stages be made including providing budget, and justification of the project. These steps should be used to guide the rest of the function analysis process. It emerged

*Table 4.25: Awareness of value management * Firm is Architectural or QS * Mode of becoming aware of value management: Cross-tabulation*

How did you become aware of value management?			Is your firm an Architectural firm or QS firm?		Total
			Architect	QS	Architect
Formal Training	Are you aware of value management?	Yes	1	7	8
	Total		1	7	8
On the job Training	Are you aware of value management?	Yes	5	4	9
	Total		5	4	9
Others	Are you aware of value management?	Yes	3	2	5
	Total		3	2	5

Source: Researcher 2009

from the study that there wasn't any coherent system that was used even by those who claim to have applied value management techniques. Cost optimization is not a preserve of value management. 50% of respondents reported to have carried out cost optimization exercises. However, this may be attributed to a try-and-fit in the budget arrived at after initial cost estimate but not because of applying value management techniques.

It must not be forgotten that only 27.5% of the respondents were formally trained in value management but up-to 40.5% of the respondents generated alternative proposals. It is necessary that non-technical members like the users and such like stakeholders to make their input for the value management technique to be complete.

It can be argued that most developers have a fixed mind of what they would want to build. They may not request your alternative views but as a consultant, one of the responsibilities is to advice the client appropriately and at the earliest opportune time. This may require to advice the client against the project but at the same time come up with alternative proposals. 36.8% of respondent had been able to analyse and advice their client to change their investment proposal to a more viable one.

*Table 4.26: Awareness of value management * Firm Architectural or QS * Any advantage over alternative methods of cost management where applied Cross-tabulation*

In the project that you applied value management, was there any advantage over alternative methods of cost management that would have been employed?			Is your firm an Architectural firm or QS firm?		Total
			Architect	QS	Architect
Yes	Are you aware of value management?	Yes	1	7	8
	Total		1	7	8
No	Are you aware of value management?	Yes	3	1	4
	Total		3	1	4
Not Applied	Are you aware of value management?	Yes	3	5	8
		No	1	3	4
	Total		4	8	12

Source: Researcher 2009

Initial cost estimate is usually done at preliminary stage under the traditional method of contract procurement, and if the designs are found to be within the budget, no further cost analysis or cost estimate is done because the project is predicted to be within budget. Indeed this is corroborated by 33.88% of the respondents. A cost check at tender stage greatly identifies and reduces errors in tender documents. This step or stage is carried out by the consultants. It may even identify locked-in costs. 50% of the respondents said they carry out this important and essential exercise.

Unfortunately, locked in costs are not addressed and removed in most projects until perhaps during construction stage. While fixed decisions by clients may not be changed, it would be interesting to learn the impact of such decisions on the value or cost of the project. None of the respondents carried out this exercise as part of the function analysis.

4.4.3 Contract Procurement Method

Method of contract procurement has an influence on application of value management. The contractor's vast experience and hands on proposals may not find their way into project if the contractor is appointed too late. 75% of the respondents used traditional method of contract procurement simply because traditional procurement method has been used in this country much longer than the other methods of contract procurement. This has tended to obscure use of non-traditional contract procurement methods and entry of new techniques. Contemporary contract procurement methods are generally new in this country. These methods of contract procurement include Design and Build, Build Own Operate Transfer and its derivatives, Contract Management, cost plus, etc. They are relatively new in Kenya, having been introduced after year 2000 in the Public Sector. The current Public Procurement and Disposal Act (2005), may be a turning point in how contracts shall be procured and manage in this country.

The contractor is the person charged with the responsibility of translating the magnificent designs into built facilities. The contractor, being a hands-on person has a wealth of knowledge in materials and construction processes that would assist in cost optimization of the project. This would be achievable only if the contractor is appointed early and made an active member of the project team. The study found that even on those consultants who are aware of and applied value engineering techniques, the contractor was appointed at detail design stage. Those not aware of value management techniques appointed contractors at sketch design stage and used contemporary methods of contract procurement, more particularly, design and build method.

The study investigated through the consultants, about the contractor's input and found that 38.5% contractors made suggestions that were eventually incorporated into the works. 61.5% did not contribute anything and were also not consulted on their knowledge or expertise. Out of those contractors consulted and inputs incorporated in the works, 25.6% were consulted by persons formally trained in value management and 12.9% were consulted by those who are not aware of value management. It can therefore be argued that even for those who know about value management they are not fully utilizing this knowledge.

One discouraging aspect is that even for those who are aware of value management, 70% registered cost overruns and only 30% registered cost savings. This does not necessary translate to failure of the technique but perhaps failure in its application or enhancement of initial cost in view of what the client "wants". This observation seems to go along with the end product because 47.4% opined that the value of end product was higher and 44.8% thought it was the same as initially designed.

On further interrogation, those aware of value management responded that the final cost of the project would have changed if the contractors change proposal had not been incorporated whereas 56.25% believe that there wouldn't have been any change in cost of works. The question was non-directional as the change can be either way, though for the betterment of the project. However, the issue here is that even those who are aware of value management seem to believe that there would not be any significant change.

4.4.3 Motivation and Training

Robbins, Odendaal, and Roodt (2003) define motivation as the process that accounts for an individual's intensity, direction and persistence of effort towards attaining the organization goal. Remuneration for value management may be one big factor as to why value management has not picked in the private sector. In the recent past there has been tremendous increase in procurement of professional services through competitive bidding of fees. Examples include the advertisements in the Daily Nation newspaper of 16th April, 2009 and 31st July, 2008. This method does not encourage or give motivation to practice of value management. This has inevitably diminished fees for consultants and practice of value management under this regime will only be possible if procured separately.

4.4.4Compensation

Compensation for contractor's input was found to be only 2.5% of the respondents; the rest were not compensated. This is one reason which has contributed to the slow picking or lack of enthusiasm to practice value management. To the consultants, 82.4% were not compensated for their inputs. It must be understood clearly that compensation is by way of sharing in the total savings arising from the applied value

management techniques and not otherwise. The formula for compensation must, of necessity, be pre-agreed on so that each party gets their rightful share of the savings.

Table 4.27: Reasons for no compensation for consultants

		Frequency	Percent	Valid percent	Cumulative Percent
Valid	The consultant did not ask for compensation	1	2.5	11.1	11.1
	The client felt that the effect were part of my obligation	5	12.5	55.6	66.7
	Fixed Fee contract	2	5.0	22.2	88.9
	There is no specific charges outlined in the Act	1	2.5	11.1	100.0
	Total	9	22.5	100.0	
Missing	N/A	26	65.0		
	No Response	5	12.5		
	Total	31	77.5		
Total		40	100.0		

Source: Researcher 2009

4.4.5 Historical Perspective of the Sample Project

The study asked the consultants about the historical perspective of the project in question. The historical perspective would give an opportunity to reflect on the project and find out what was achieved and what may require to be improved on. The historical perspective is discussed briefly here below.

Early completion: 48.7% thought it was crucial to complete the project early. This was not reflected in the responses on application of value management techniques.

Complexity: 58.9% of the projects were of moderate design which may have influenced the method of contract procurement and application of value management techniques.

Quality level: 56.4% of the projects were of medium design i.e. average complexity, not prestigious and not basic. This may again influence application of value management and contract procurement.

Price certainty: 64% respondents were of the opinion that price certainty was necessary to the developer. This however was not supported by cost overruns because 77.2% registered cost overruns. This did not reflect well on the thoroughness of application of value management techniques or cost planning and control techniques.

Risk avoidance: Whereas 59% responded that the client was ready to try new materials and techniques, this was not supported by action. The level of compensation to contractors and consultants was very low thereby discouraging investment of resources towards value management techniques. Perhaps this explains the 67% and 82.4% lack of compensation to contractors and consultants respectively.

Table 4.28: Risk avoidance - resistance to incorporate new ideas, material and techniques

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, to avoid risks	16	40.0	41.0	41.0
	No, ready to try new	23	57.5	59.0	100.0
	Total	39	97.5	100.0	
Missing	N/A	1	2.5		
Total		40	100.0		

Source: Fieldwork, 2009

The study enquired opinion of the respondents if value management techniques were any better than alternative methods of cost management and 67% of the respondents thought it was better. However, this is not supported by responses from their projects. Cost overruns were more than cost savings. Among other things value management tends to identify designed in costs. It is only through training and practice that one may identify designed-in costs.

The level of awareness is very low because it is only 27.5% of respondents who are formally trained. It is, therefore, hard to justify the respondents 73.3% argument that there were no designed-in costs which could have been removed. Designed-in costs arise usually from the consultants' failure to synchronise *use* or *aesthetics* functions and the design parameters.

It has come out clearly that a large number of practicing architects and quantity surveyors are not aware of value management. The study therefore asked the respondents about home grown solutions that would address improvement of awareness. 70% recommend that professional bodies like the AAK, IQSK and BORAQS be charged with creating awareness among its membership through seminars and workshops or continuous professional development and short courses.

Respondents have also suggested introducing the course at the University and encouraging co-operation among the professionals. It has also been suggested to carry out research on value management techniques in Kenya. Value management should be compensated whenever these services are offered. This is one area that must be addressed to encourage those already trained, to practice it.

4.5 Challenges and Hindrances to the Application of Value Management

4.5.1 Challenges

The third research study question was to seek challenges and reasons that hinder application of value management. 33.3% of respondents said there are advantages, 16.7% say there are none and 50% did not apply value management techniques. This implies a relatively low application but shall increase as the number of persons who are formally trained increases in the industry.

The challenges met in practice of value management as detailed by respondents include lack of homogeneous awareness, lack of compensation, and lack of interest, resistance and indifference among the key stakeholders. Only 15% of the respondents were compensated for the additional services rendered, and just like the contractors, compensation for additional services rendered is not appreciated by clients. Many clients argue that is why the consultants are there in the first place and therefore do not deserve additional compensation! The developers may not have understood the concepts of value management in the first place.

Lack of compensation for those who had applied value management techniques were attributed to bidding for fees, client's indifference in appreciating extra services, fixed lump-sum fee, and lack of structured fees charges in CAP525. This scenario would

easily scare away any potential value management consultant until their efforts are recognized. The varied reasons from respondents can be summarized by there being a defined role, guideline and structured fee scale for value managers through a registered professional association.

Despite applying the value engineering and management techniques, some

Table 4.29: Challenges of practicing value management/Engineering in Kenya

		Responses		Percent of Cases
		N	Percent	N
m(a)	Lack of awareness	15	20.8%	53.6%
	Resistant from consultant	12	16.7%	42.9%
	Training inadequacy	11	15.3%	39.3%
	Lack of compensation	5	6.9%	17.9%
	Traditional procurement system normally used does not encourage it	4	5.6%	14.3%
	No specific guidelines on the scale of fees to be charged	4	5.6%	14.3%
	Rigidity	3	4.2%	10.7%
	Lack of appreciation	3	4.2%	10.7%
	Economy not vibrant	3	4.2%	10.7%
	Time factor/consuming	3	4.2%	10.7%
	Lack of new building materials and technology	3	4.2%	10.7%
	Clients would like to minimize high costs professionals	2	2.8%	7.1%
	It de-links consultants from the construction	1	1.4%	3.6%
	Legal factors	1	1.4%	3.6%
	Most projects on very tight budget	1	1.4%	3.6%
	Bureaucratic hitches on public project	1	1.4%	3.6%
Total		72	100.0%	257.1%

Source: Fieldwork, 2009

designed-in or locked-in costs still remained. It is observed that the 26.7% of the responses said there were locked-in or designed-in costs which could have been removed. This suggests that team effort was not practiced and that is reason enough to have designed-in costs attributable to consultants. This observation made it

necessary to find out what exactly the consultants should have removed but was finally not removed.

According to the respondents, the main areas for these designed–in costs were; expensive structural designs, expensive architectural designs, choice of expensive materials by client, expensive standard of products and delay in payment and time factor. It is not clear in which way time was a factor but perhaps time was too short or excessively too long. Either way, additional costs of acceleration, overtime or fluctuation in cost of inputs and overhead cost would come into play. Each of these variables mentioned by the respondents would have been addressed and appropriate measures taken.

4.5.2 Hindering Factors

The study investigated hindering factors to practice of value management. The respondents were asked to rank these hindering factors from the most significant to the least significant in that order. Lack of awareness topped the list and was followed closely by lack of interest by clients. The third significant factor is lack of differentiation with quantity surveying. This is an important factor because the clients may need to be sensitized about the importance and difference between quantity surveying and value management techniques, though the two services may be offered by the same person or firm.

For those who have applied value management techniques, *(see table 4.31)*, sixteen reasons were stated as the challenges to its application. They include lack of awareness, resistance from consultants and inadequacies in training, which rank the top three and in that order. Other factors that were suggested include legal, tight budget, de-linking consultancy from construction, lack of time, economy not being vibrant and bureaucratic hitches in public projects.

Legal aspects are a major hindrance because there must be professional liability attributable to a specific professional for any decision regarding design, material or technology used in the project. This implies an overhaul of legal framework of the building industry to recognise and allocate fees and professional liability. Large scale

sensitization for the stakeholders, viz; the consultants, contractor and clients would need to be carried out.

Table 4.30: Intra-industry hindering factors to the practice of Value Management

HINDERING FACTORS	N	PERCENT
i. Lack of awareness by consultants, clients, contractors	32	23.0%
ii. Lack of interest by clients and consultants	29	20.9%
iii. Resistance from consultants	25	18.0%
iv. No identifiable need, no difference with Quantity Surveying	24	17.3%
v. Resistance from contractors	22	15.8%
vi. Lack of appreciation	4	2.9%
vii. Malpractice in the industry	1	0.7%
viii. Mutual trust of all involved	1	0.7%
ix. Consultants de-linked from construction hence are not aware of some alternatives	1	0.7%
Total	139	100%

Source: Fieldwork, 2009

4.5.3 Suggestions from Respondents

It was found that unstructured value management techniques were applied though to varying degrees. It was necessary to seek suggestions from the respondents on what should be done to start, improve and increase application of value management techniques in the building industry in Kenya.

4.5.3.1 To Start the Practice

Out of the responses received, creating awareness among the practitioners through continuous professional development seminars and workshops, introducing curriculum in the universities and co-operation between and among design team are the three main suggestions to start practice of structured value management. This would increase the level of awareness in the building industry and eventual increase in its practice or application.

Table 4.31: Challenges within and without the industry

CHALLENGES		PERCENT
i.	Legal factors	16%
ii.	Most projects on very tight budget	16%
iii.	It de-links consultants from the construction	16%
iv.	Clients would like to minimize costs of highly professionals	11%
v.	Rigidity	10%
vi.	Lack of appreciation	10%
vii.	Economy not vibrant	10%
viii.	Time factor/consuming	10%
ix.	Lack of new building materials and technology	10%
x.	Traditional Procurement system normally used does not encourage it	6%
xi.	No specific guidelines on the scale of fees to be charged	6%
xii.	Lack of compensation	4%
xiii.	Training inadequacy	3%
xiv.	Resistance from consultant	2%
xv.	Lack of awareness	1%
xvi.	Bureaucratic hitches on public project	1%

Source: Fieldwork, 2009

Table 4.32: Suggestions to start practice of structured value management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Create awareness among AAK (Architectural Association of Kenya bodies)	19	47.5	67.9	67.9
	Introducing it to the college curriculum	8	20.0	28.6	96.4
	Cooperation within the design team members	1	2.5	3.6	100.0
	Total	28	70.0	100.0	
Missing	N/A	2	5.0		
	No Response	10	25.0		
	Total	12	30.0		
Total		40	100.0		

Source: Fieldwork, 2009

4.5.3.2 To Improve the Practice

The main suggestions on how to improve practice of value management are by training professionals, carrying out research in the area of value management and compensating value management services when offered.

Table 4.33: Suggestions to improve practice of structured value management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Do research	4	10.0	23.5	23.5
	Training professionals in the AAK bodies	9	22.5	52.9	76.5
	Compensating value engineers and other consultants	4	10.0	23.5	100.0
	Total	17	42.5	100.0	
Missing	N/A	2	5.0		
	No Response	21	52.5		
	Total	23	57.5		
Total		40	100.0		

Source: Fieldwork, 2009

4.5.3.3 To Increase the Practice

Six suggestions were put forward to increase practice of value management. They include creating awareness among professionals, Government to take a leading role; marketing and introducing courses at Universities in that order. Government's world over are the main drivers of practice of value management and engineering. They include the USA, Australia, New Zealand, the United Kingdom India and Indonesia to mention a few. Other suggestions include, use of contemporary procurement methods like Design and Build, compensating consultants, review of existing construction laws, rules and regulation and introducing the course in institutions of higher learning.

Table 4.34: Suggestions to increase practice of structured value management.

		Responses		Percent of Cases
		N	Percent	N
n(a)	Government to take a leading role	2	12.5%	13.3%
	Use of contemporary procurement methods e.g. Design and Build	1	6.3%	6.7%
	Creating awareness to professionals so that they can understand and appreciate it	7	43.8%	46.7%
	Marketing it to link project clients with professionals and users	2	12.5%	13.3%
	Compensating consultants	1	6.3%	6.7%
	Review of existing construction rules	1	6.3%	6.7%
	Introducing the course in institutions of learning	2	12.5%	13.3%
Total		16	100.0%	106.7%

Source: Fieldwork, 2009

4.6 Institutional Framework

4.6.1 CAP 525 Laws of Kenya

Currently the most prominent procurement method in Kenya is where design is separated from construction, commonly referred to as the traditional method. The building and construction rules of procurement and duties for consultants are governed by CAP 525 Laws of Kenya. The Act clearly defines both duties and remuneration for consultants. The structure of CAP 525, Laws of Kenya, gives the Architect a prominent role in the management of a building undertaking. The stages of consultancy for Architects are detailed in Part 3 of the Fourth Schedule: –

1. The normal services for architects are, inception where no fee is due except on special circumstance;
2. outline proposal where the architect receives, interprets and makes outline proposals or initial proposal for further discussion – fees up-to this stage is 1% of cost of construction.
3. Scheme design is the 3rd stage where the Architect, in consultation with other consultants prepares Cost Estimate, and drawings for submission to the Local Authority for approval.
4. The 4th stage is production of drawings and necessary Bills of quantities and tender action.

5. The last stage for the architect and his team is to implement the project on site to completion. Up to this stage fee is 6% for the architect.

By the very structure of CAP 525 Laws of Kenya, the architect is the lead consultant and all other consultants are appointed on advice of the architect. Part 5 of Fourth Schedule, *Additional Services,* comes close to proposing value management in clauses E3, E4 and E6 but does not either explicitly propose or budget or direct value management. As explained by the above exposition, the value management exercise falls outside the normal consultancy services as defined in CAP 525.

4.6.2 The Ministry of Public Works

A questionnaire was designed and administered to the Ministry of Public Works and the following are the findings. The Ministry of Public Works was approached as a consultant only because it consultants for all other government ministries. The response was as follows:-

1) **Contract procurement:** The Ministry of Public Works uses the Traditional Method of contract procurement. However other procurement methods are being used on a pilot basis.

2) **Cost management system:** the Ministry uses design to cost method. This requires that a budget may or may not be provided by client ministry at initial stages but as soon as Ministry of Public Works make their preliminary designs and Cost Estimates, they present same to client Ministry for Approval or otherwise before proceeding further. Further design proposals must fit within the given budget.

3) **Application of Value Management Techniques:** the Ministry currently does not have a policy in position for the application of value engineering and management techniques.

4) **What are the hindering factors?** In the course of the interview it emerged that there are individuals including the interviewee in the Ministry of Public

Works who are aware of value engineering and management techniques through formal training but there is no policy to employ these techniques.

5 to 10) Since the Ministry of Public Works does not apply value engineering and management techniques, it was not possible to answer questions 5 to 10.

11) Suggestions to start, improve, and/or increase practice or value management by the Ministry of Public Works.

Trained personnel is not the main problem. Some of the Ministry of Public Works architects and quantity surveyors are trained in value management techniques. The rest can be trained through seminars, workshops and short courses. There are however a few who have trained and learnt about value management. The universities are now training construction managers who have the basic training in Value Management. However, the Ministry of Works does not have a structured way of;

a) Employing construction managers

b) Training existing staff to practice value management

To address the problem of practicing value management the respondent suggested that the Ministry must;

i) Recognise and appreciate the benefits of applying value management techniques

ii) Test the benefits through pilot projects

iii) Make policy to that effect about its practice

iv) Implement the policy after successful piloting thus creating demand for these services.

The Ministry of Public Works through BORAQS is charged with the responsibility of management and regulation of practice of architects and quantity surveyors through CAP 525 Laws of Kenya. The government through the Ministry of Public Works is also the single largest consumer of architects and quantity surveyors services in the country. Creating effective demand for value engineering services would inevitably encourage the private sector to follow suit. This would further increase training and awareness and create more jobs directly and indirectly.

4.7 Hypothesis Testing

The research hypothesis was that the practice of structured value management **DOES NOT** significantly reduce cost overruns in the building projects in Kenya.

The value of D was calculated using the following formula.

$D = Maximum \left| F_O(X) - F_T(X) \right|$

$F_O(X)$ = the observed cumulative frequency distribution of a random sample n

X = any possible score

$F_O(X) = k/n$

k = any number of scores equal to or less than n

$F_T(X)$ = the theoretical distribution under Ho

$\alpha = 0.05$

$n = 40$

Table 4.35 was used to test relationship between cost savings or overrun and application of value management. The respondents were also requested to explain the savings or cost overrun. This was necessary to be able to identify cost changes that are attributable to value management and those that are not. Tables 4.36 and 4.37 indicate explanations from the respondents. Eight had recorded savings but one respondent did not explain the savings.

Table 4.35: Cost overruns or Savings for the Project

		Frequency	Percent	Valid Percent	Cumulative percent
Valid	Savings	8	20.0	22.2	22.2
	Overruns	28	70.0	77.8	100.0
	Total	36	90.0	100.0	
Missing	N/A	2	5.0		
	No Response	2	5.0		
	Total	4	10.0		
Total		40	100.0		

Source: Research 2009

Table 4.36: Explain cost savings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fixed price/contract	4	10.0	57.1	57.1
	Cost control/planning	2	5.0	28.6	71.4
	Alternative materials and technology were required which led to more savings	1	2.5	14.3	85.7
	Total	8	20.0	100	100
Missing	N/A	30	75.0		
	No response	3	7.5		
	Total	33	82.5		
Total		40	100.0		

Source: Researcher 2009

Table 4.37: Explain cost overrun

		Responses	
		n	Percent
1	Changes involved finishes and fittings	2	6.9
2	Clients new requirements	9	31.0
3	Users new requirements	2	6.9
4	Unforeseen site conditions	5	17.2
5	As a result of variations	3	10.3
6	Long construction period/changes in phased construction time	3	10.3
7	Delays in procurement of equipments pushed the costs up	2	6.9
8	Delays in fund submission/lack of funds	1	3.4
9	Functional inefficiency in design	1	3.4
10	Currency fluctuations was to the contractor's disadvantage since the contract was in US Dollars	1	3.4
11	Total	29	100.00

Source: research 2009

The critical value of D at 95% confidence for n = 40 is 0.215 (See appendix D) and derived from the formula

$$D = \frac{1.36}{\sqrt{40}}$$

$$= 0.45$$

The calculated value of D in this research study is detailed below in Table 4.39

Table 4.38: One sample statistics

	No response	No cost Change	Cost savings	Cost overruns
Frequency n	2	2	8	28
$F_O(X)$	2/40 = 0.05	4/40 = 0.05	12/40 = 0.2	40/40 = 1.0
$F_t(X)$	10/40 = 0.25	20/40 = 0.5	30/40 = 0.75	40/40 = 1.0
$\lvert F_O(X) - F_T(X) \rvert$	8/40 = 0.2	16/40 = 0.4	18/40 = 0.45	0

Source: Researcher, 2009 – Adopted from Cooper and Schindler page 675

The greatest absolute D value calculated from the observation is 0.45. This D value is greater than the critical D value = 0.215 for the ***Null hypothesis***.

4.7.1 Interpretation of the KS-test results

If the D-value associated with the t-test is greater than the D value for the H_O, D > 0.215, then there is evidence to reject the null hypothesis in favour of the alternative. In other words, there is evidence that the mean is significantly different than the hypothesized value. If the D - value associated with the KS-test is not larger than the critical value (i.e. D< 0.215), there is not enough evidence to reject the null hypothesis, and therefore conclude that the mean is not different from the hypothesized value.

Since the calculated value of D is greater than 0.215 (i.e. D = 0.45), the research therefore, on this basis, rejects the H_0, meaning that the study accepts the H_1, that the practice of structured value management **DOES** significantly reduce cost overruns in building projects in Kenya.

CHAPTER 5

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This section concludes the study project. The objective of the study was to investigate the application of value management as a tool for cost management in the building industry. Objectives of the study and hypothesis have been set out, related literature has been reviewed, data has been collected and analysed. The following paragraphs shall wrap up the study through conclusions and recommendations.

5.1 Report of Findings

The first objective of the research was to investigate the extent of application of value management in the building industry in Kenya. The findings of the research are that the extent of formal application of value management techniques in the building industry in Kenya is very low. The little application observed in this study is informal and coincidental for both public and private sector projects. The public sector uses design-to-cost method of cost management. The private sector on the other hand uses the cost plan method though to varying degree of application.

The second objective was to investigate the level of awareness of value management in Kenya. The findings of the study are that the level of awareness among the consultants is low. There are, however, architects and quantity surveyors who are aware of VM but are not practising it. Awareness needs to be increased through multi-dimensional approach which includes training and sensitization of the stakeholders in the building industry. The traditional contract procurement method of contract procurement is widely known and practised.

The third objective was to investigate the challenges and factors that hinder application of value management. The findings of the research were that challenges and hindrances include:-

a) lack of formal or on the job training
b) lack of awareness among consultants, contractors and developers. This includes citing lack of time, tight budget, and economy not being vibrant as reasons for not applying value management

c) lack of legal infrastructure including professional liability
d) lack of interest by developers
e) lack of appreciation and compensation by the developers
f) rigidity by stake holders to manage project as they have done before
g) lack of government policy to apply value management in their projects
h) traditional contract procurement method does not encourage value management practice
i) de-linking of consultancy from contracting
j) resistance by contractors, clients and/or consultants
k) malpractices and external influence in the building industry
l) lack of effective demand i.e. demand backed by ability to pay

are the major challenges and hindrances to application of value management techniques in the building industry.

5.2 Results of the Test

The Null hypothesis was rejected meaning that there is enough data to support application of value management as a tool for cost management in the building industry in Kenya.

5.3 Conclusion

From the findings of the study it was concluded that:-

a) it was apparent that the level of application of value management is very low. The low application was attributed to the low level of awareness and lack of effective demand.
b) It can also be concluded that the Architect, being the lead consultant as detailed in CAP 525 Laws of Kenya, must be aware and interested in applying value management.
c) The government should develop and implement a policy to apply value management in the public projects.
d) To increase awareness, the universities should introduce value management in the curriculum for teaching architecture and quantity surveying.
e) Professional and welfare associations should sensitise and promote value management to their membership thorough seminars and workshops

f) When reflected against the manifestation of problems that can be addressed through value management, the construction industry requires new methods of contract procurement for it to provide value for money for the developer.

5.4 Recommendations

The research recommends that;-

a. Value management be promoted through continuous professional development, short courses, seminars and workshops
b. the developers be sensitized about value management in the building industry
c. the developers be educated on payment of fee for services rendered through relevant welfare and professional bodies
d. The government to develop a policy and introduce value management as a requirement in all their building projects.
e. A legal framework be put in place to govern, manage and regulate the application of value engineering and management in the building industry.
f. The university to introduce value management in the curriculum for teaching architecture and quantity surveying
g. Contemporary contract procurement methods be introduced and implemented in the building industry
h. Research and development (R & D) on new materials, systems and technologies be encouraged. This will greatly assist implementation of VM

5.5 Areas of Further Research

Areas of further research include;

- Study of awareness of value management practice in the building industry by Investors.
- Long term effects of negotiated fee on application of value management in the building industry.
- Research on the necessary legal framework to govern, manage and regulate the application of value engineering and management in the building industry in Kenya.

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APPENDICES

APPENDIX A – QUESTIONNAIRE FOR ARCHITECTS AND QUANTITY SURVEYORS

Serial No.....

Date.....

Q1) a) Name of Firm (Optional).....

b) Full range of services offered by your Firm .....

.....

Q2) How many full time professionals (University graduates) does your organization have?

Tick as appropriate	None	One	Two	More than 2
i) Architects	☐	☐	☐	☐
ii) Quantity Surveyors	☐	☐	☐	☐
iii) Construction Project Manager	☐	☐	☐	☐

Kindly provide a list of project handled and completed by your firm between years 2000 and 2008 and whose initial contract sum exceeds KShs. 20,000,000/=. One project shall be selected at random to help in answering the following questions.

SECTION – A

Q3) Project Data: Please indicate as appropriate

a)	b)	c)	d)	e)	f)	g)	h)	i)	j)
Composition of Project Team	Consultants or Design Team Composition	Initial Budget KShs.	Date (Yr) of Commence.	Initial contract sum KShs	Final contract sum KShs	Cost overrun or savings KShs	Initial Contract Period	Final Contract Period	Time overrun or saving
1. Client 2. Users 3. Consultants 4. Contractor	1. Arch 2. QS 3. Services Engineer 4. Struct./ Civil Engineer								

Q4) The project is

a) Public ☐

b) Private ☐

Q5) At what point was your firm appointed?

a) Inception Stage ☐

b) Feasibility Stage ☐

c) Preliminary Design Stage ☐

d) Detail Design Stage ☐

Q6) Scope of consultancy included

a) Normal Architectural/Quantity Surveying service as per CAP 525

b) Value Management Services

c) Other, specify.....

Q7) Did the client provide a budget at briefing Stage?

Yes ☐ No ☐

SECTION - B

Q8.) Please tick the stages that your firm carried out in the design and supervision process of the project.

A. Did the Developer provide written notes to inform the team about the project, rationale, planning and preliminary work already done?

Yes ☐ No ☐

B. Did the Developer explain and justified to the team the project and any fixed decisions that may have been made?

Yes ☐ No ☐

C. Were the function aspects of the **project, space, elements and components** thoroughly analyzed at different times?

Yes ☐ No ☐

D. Were areas where significant cost optimization could be achieved identified?

Yes ☐ No ☐

E. Were the **Project team** members asked to generate alternative ideas and proposals of the areas identified in (D) above?

Yes ☐ No ☐

F. Was a detailed assessment of all ideas, generated carried out to come up with alternative proposals?

a) Yes b) No

G. Were the alternative proposals further evaluated by the **Design Team** or **Consultants** to select the optimal one?

Yes ☐ No ☐

H. Final recommendations were presented to the developer for implementation.

Yes ☐ No ☐

SECTION - C

Q9) To achieve optimal cost benefits, it is necessary to identify high impact areas where changes would result in large value addition. These areas include high cost items and large work components like concrete. Were these high impact items or areas identified?

Yes ☐ No ☐

SECTION - D

Q10). Function analysis is a systematic process to identify ***use*** and ***aesthetic function*** of the intended built facility. It involves defining function, evaluating the function and seeking alternatives that would fulfil the same function and implementing the ***most cost effective*** alternative. To improve Value in this project did the **project team**

a) Identify and define basic function?

Yes ☐ No ☐

b) Evaluate the function?

Yes ☐ No ☐

c) Generate alternatives that could achieve the same function?

Yes ☐ No ☐

d) **Design team** prepared scheme designs and related cost plans.

Q11.) If yes to **10 a, b, c** above at what stage or stages was the ***function analysis*** done?

a) Inception
b) Feasibility
c) Preliminary Design
d) Detail Design
e) During construction
f) Not applicable

SECTION - E

Q12). In the course of your practice have you analyzed or reviewed a client's brief and changed project from initially intended to completely new one because of the comparative values of the alternative projects?

Yes ☐ No ☐

SECTION - F

Q13.) At Preliminary Design Stage, did you prepare initial cost estimate?

Yes ☐ No ☐

Q14.) If YES to question 13 was the cost estimate within the budget?

Yes ☐ No ☐ No Budget ☐

Q15.) Were there further ***alternative design schemes, materials and/or techniques*** and corresponding alternative cost estimates after fitting within the budget?

Yes ☐ No ☐

Explain.....

SECTION - G

Q16.) At detail Design Stage it is clear about most design parameters, intended quality of finished product and specifications. Did you carry out a cost check before tender?

Yes ☐ No ☐

Q17.) Was the detailed cost estimate still within the preliminary budget?

Yes ☐ No ☐

Q18.) At this stage were there any alternative proposals made towards improvement of:

a) Cost Yes ☐ No ☐

b) Quality Yes ☐ No ☐

c) Time Yes ☐ No ☐

Q19.) If YES to question 18, how were the alternatives arrived at? Choose one only

If NO, skip questions 19, 20, 21, 22, 23 and 24.

a) None ☐

b) Design team met with users and customers for a design critic ☐

c) External team and facilitators were invited for design critic in the client's/consultant's office ☐

d) Team held a working retreat away from office with facilitators ☐

Q20.) If answer to question 19 is (d) was the cost of the retreat and fees priced?

Yes ☐ No ☐

Q21.) What was the percentage savings attributable to the function analysis?

a) Less than 5%

b) 5% to 10%

c) 11% to 25%

d) Over 25%

Q22.) Was the effort worth the savings?

Yes ☐ No ☐

Q23.) Would you do a similar exercise for the next project?

Yes ☐ No ☐

Q24.) During the retreat session, the following proposals were arrived at – choose as appropriate

a) Use alternative process of construction to improve time performance

Yes ☐ No ☐

b) Use alternative materials which are cheaper but of similar quality

Yes ☐ No ☐

c) Factored in life cycle costs of alternative materials

Yes ☐ No ☐

SECTION - H

Q25.) Were there any fixed and hence **locked – in** decisions that could not be changed at briefing, design and implementation stages?

Yes ☐ No ☐

Q26.) If yes to question 25, please indicate to whom such locked - in **decisions** were attributable to. If more than one please indicate relative percentage contribution

a) client ☐ ..... %

b) consultants ☐ ..... %

c) contractor ☐ ..... %

d) users ☐ ..... %

Q27.) If YES to question 25, did you price them against alternative proposals?

Yes ☐ No ☐

SECTION - I

Q28) Were alternative methods of contract procurement, their merits and demerits explored at inception stage?

Yes ☐ No ☐

Q29.) The method of contract procurement used for this project was

a) Traditional Method ☐

b) Contemporary Method ☐

Q30.) In your opinion, would you say that this was the best contract procurement method and therefore the best cost management method?

Yes ☐ No ☐

Q31.) If contemporary which one in particular?.....

.....

Q32) If contemporary, at which point was the contractor appointed?

Sketch design Detail design Design & build Not Applicable

SECTION - J

Q33) Did the contractor propose changes that were eventually incorporated in the project?

Yes ☐ No ☐

Q34) Were there cost overruns or savings for the project?

1 - Savings 2 - Over-run

Please explain.....

Q35) What was the final quality of the built facility compared to inception/preliminary design level?

Higher ☐ Lower ☐ Same ☐

Q36) In your opinion if the contractor's change proposals were not incorporated in the works would the final cost of the project have changed?

Yes ☐ No ☐ Not Applicable ☐

Q37) If yes to question 36 was the contractor compensated for his input?

Yes ☐ No ☐ Not Applicable ☐

Q38) Were you compensated for all your efforts above the normal engagement?

Yes ☐ No ☐

SECTION - K

Q39.) Please tick one item only the perception of your firm's priorities for this project.

A. How important was early completion to the success of the project? Please tick one

(i) Crucial ☐

(ii) Important ☐

(iii) Not as important as other factors ☐

B. Controllable variation: was the need foreseen to alter the project once it had begun on site?

(i) Yes ☐

(ii) Definitely not, it could have been avoided ☐

C. Complexity-Did the building need to be technically advanced or highly serviced?

i) Yes ☐

ii) Moderately so ☐

iii) No. Just simple ☐

D. Quality level - What level of quality was required in the design, materials and workmanship?

i) Basic competence ☐

ii) Good but not special ☐

iii) Prestige ☐

E. Price certainty - did the client need a firm price for the project before committing to proceed?

i) Yes

ii) A target plus or minus was enough

F. Risk avoidance - was there resistance to incorporate new ideas, material and techniques in this project?

i) Yes, to avoid risks

ii) No, ready to try new

SECTION - L

Q40.) Are you aware of Value Management?

1 – Yes 2 - No

Q41.) How did you become aware of Value Management?

1. Formal Training
2. On the Job training
3. Other, specify.....
4. Not applicable

SECTION - M

42) In the project that you applied value management, was there any advantage over alternative methods of cost management that would have been employed?

Yes ☐ No ☐ Not Applied ☐

Q43.) Were you compensated for the value management exercise?

Yes ☐ No ☐ Not Applicable ☐

Q44.) If no to question 43, why? .....

.....

Q45.) In your opinion were there any designed-in or locked-in costs which could have been removed?

Yes ☐ No ☐ Not Applicable ☐

Q46) If yes to question 45, please list them.

a) .....

b) .....

c) .....

d) .....

e) Not Applicable .....

SECTION - N

Q47) What are the hindering factors of practicing Value Management/Engineering? Tick as many and rank them where 1 is the most significant and the last one is the least significant hindrance.

i) Lack of awareness by consultants, clients, contractors

ii) No identifiable need No difference with Quantity Surveying

iii) Resistance from consultants

iv) Resistance by contractors

v) lack of interest by clients and consultants

vi) Others, specify.....

Q48) What are the challenges of practicing Value Management/Engineering in Kenya?

a).....

b).....

c).....

d).....

e).....

f).....

Q49.) What would you suggest to start, improve or increase practice of structured value management?

a) Start.....

b) Improve.....

c) Increase.....

Thank you for your co-operation.

APPENDIX B - KEY INFORMANT QUESTIONNAIRE

Date.....

Declaration

This questionnaire is for academic purposes only and all information provided shall be confidential. Your assistance in the completion of this questionnaire will be highly appreciated.

Q1) What methods of contract procurement are currently being used by the Ministry of Public Works on building projects.

a) Traditional Method .....

b) Contemporary Methods .....

c) Others.....

Q2) What systems does the Ministry of Public Works apply for Cost Management of its building projects.

a) .....

b) .....

c) .....

Q3) Does the Ministry of Public Works apply Value Engineering and Management Techniques?

No ☐ Yes ☐

Q4) If no to question 3 above, what are the hindering factors of practicing Value Management/Engineering?

i) .....

ii) .....

iii) .....

Q5) Governments have been driving application of Value Engineering techniques world over for example the U.S.A., Australia and U.K. Are there any eminent policy change to start applying Value Management techniques?

.....

.....

.....

Q6) If yes to question 3 above, how does the Ministry conduct the function analysis?

a) .....

b) .....

c) .....

d) .....

e) .....

Q7) Does the Ministry price the cost of Value Engineering/Management exercise?

Yes ☐ No ☐

Q8) What is the criteria used by the Ministry for subjecting a project to Value Engineering techniques?

.....

.....

.....

Q9) Please use a typical project built and completed between year 2000 and 2008 where the technique has been applied and elaborate on

a) Net change in price: Contract Sum KShs...../= Year.....

Savings KShs ...../= Overrun ...../= % age .....

i) Explain Cost Change

.....

.....

.....

b) Final quality of the project compared to original design at Inception stage

Higher ☐ Lower ☐ Same ☐

i) Explain Quality Change

.....

.....

.....

.Q10) What are the challenges of practicing Value Management/Engineering in Kenya?

a).....

b).....

c).....

d).....

e).....

f).....

Q11) What would you suggest to start, improve or increase practice of value management by the Ministry of Public Works?

a) Start.....

b) Improve.....

c) Increase.....

Thank you for your assistance and co-operation

APPENDIX C - LETTER OF INTRODUCTION

UNIVERSITY OF NAIROBI

DEPARTMENT OF REAL ESTATE AND CONSTRUCTION MANAGEMENT

P.O. Box 30197, 00100 Nairobi, KENYA, *Tel: No. +254-2-2724525/9 Fax: +254-2-2718548*

E-mail: dept-recm@uonbi.ac.ke

19 June 2008

TO WHOM IT MAY CONCERN

RE: CHRISTOPHER KIBOI NDERITU – B50/P8232/2004

The above named is a student of this Department pursuing a Master of Arts Degree in Construction Management. He is currently in his final year of the course and is writing a project paper titled: - **Practice of Value Management as a Tool for Cost Management in the Building Industry in Kenya: A case Study of Nairobi Area.**

The purpose of this letter therefore is to request you kindly to allow him access into any kind of material he may require from your organization to enable him complete the project paper successfully. The information given will be used for research purposes only.

Yours faithfully,

CHAIRMAN
DEPARTMENT OF REAL ESTATE
AND CONSTRUCTION MANAGEMENT
UNIVERSITY OF NAIROBI

Dr. Hezekiah Gichunge
Chairman
Department of Real Estate and Construction Management

APPENDIX D – TABLE - ONE SAMPLE KS-test

TABLE F–5 Critical Values of D in the Kolmogorov-Smirnov One-Sample Test

Sample Size N	Level of Significance for D = Maximum $\lvert F_0(X) - S_N(X)\rvert$				
	.20	.15	.10	.05	.01
1	.900	.925	950	.975	.995
2	.684	.726	.776	.842	.929
3	.565	.597	.642	.708	.828
4	.494	.525	.564	.624	.733
5	.446	.474	.510	.565	.669
6	.410	.436	.470	.521	.618
7	.381	.405	.438	.486	.577
8	.358	.381	.411	.457	.543
9	.339	.360	.388	.432	.514
10	.322	.342	.368	.410	.490
11	.307	.326	.352	.391	.468
12	.295	.313	.338	.375	.450
13	.284	.302	.325	.361	.433
14	.274	.292	.314	.349	.418
15	.266	.283	.304	.338	.404
16	.258	.274	.295	.328	.392
17	.250	.266	.286	.318	.381
18	.244	.259	.278	.309	.371
19	.237	.252	.272	.301	.363
20	.231	.246	.264	.294	356
25	.21	.22	.24	.27	.32
30	.19	.20	.22	.24	.29
35	.18	.19	.21	.23	.27
Over 35	$\frac{1.07}{\sqrt{N}}$	$\frac{1.14}{\sqrt{N}}$	$\frac{1.22}{\sqrt{N}}$	$\frac{1.36}{\sqrt{N}}$	$\frac{1.63}{\sqrt{N}}$

SOURCE: F. J. Massey, Jr., "The Kolmogorov-Smirnov Test for Goodness of Fit," *Journal of the American Statistical Association* 46, p. 70. Adapted with the kind permission of the publisher.