ROADMAP FOR IMPLEMENTING VALUE MANAGEMENT IN THE NIGERIAN CONSTRUCTION INDUSTRY

BRUNO LOT TANKO

UNIVERSITI TEKNOLOGI MALAYSIA

ROADMAP FOR IMPLEMENTING VALUE MANAGEMENT IN THE NIGERIAN CONSTRUCTION INDUSTRY

BRUNO LOT TANKO

A thesis submitted in fulfilment of the
requirements for the award of the degree of
Doctor of Philosophy

Faculty of Built Environment and Surveying
Universiti Teknologi Malaysia

AUGUST 2018

To GOD, who has compassionately blessed me, and to my beloved wife, dad, mum, Lois, Joanna, and Judith,

Thank You!

ACKNOWLEDGEMENT

I came very close to falling out of reason while trying to understand the rationality and objectivity of how every phenomenon worked. I owe a great deal of gratitude to Assoc. Prof. Dr. Fadhlin Abdullah who contributed greatly to the quality of this thesis and provided persistent and ongoing support and enthusiasm for the initial investigation into value philosophies. Sincere thanks to Dr. Zuhaili Mohamad Ramly for his intellectual input, constant encouragement, and support in assisting to obtain quality information for this research. You both have enhanced my research and learning skills.

I am immeasurably grateful to all academics and staff in the Department of Quantity Surveying, Faculty of Built Environment and Surveying, and the school of postgraduate studies, Universiti Teknologi Malaysia. My special appreciation to Madam Fazurah Tumin, Madam Nurhafizah Samsuri, and Professor Dr. Ismail Said for their support and encouragement.

I would like to acknowledge the respective construction professionals, their professional bodies, and all those who have contributed to the successful completion of this research. Your cooperation and input are sincerely appreciated. Thanks to all my colleagues at UTM, and friends whose intellectual endeavours inspired me. Many thanks to Prof. Natasha A. Anigbogu, Prof. Emmanuel Achuenu, Dr. Jurbe J. Molwus, Dr. (Pastor) Olagoke Oladokun, Bldr Edo Ojoko Oga, Arc. Markus Bulus, QS Simon-Peter Gumgaro Buba, QS Danladi Zakari Chitumu, QS Ruya Tambaya Fadason, Arc. Isaac Sanda and Bldr Paul Wyom Zakka.

I owe significant gratitude to my Employer University of Jos, Nigeria, Kaduna State Government, International Federation of Surveyors (FIG) and management of the Nigerian Institute of Quantity Surveyors (NIQS) for their support during the course of my PhD programme. In addition, I am also thankful to my colleagues at University of Jos, Contemporary Archivision Ltd, and Plateau State Ministry of Works.

In the course of writing this thesis. I must thank my wife, Linda, my parents Sir and Lady John Tanko Mazadu, my siblings Lois, Joanna, and Judith for their love, understanding, encouragement, patience, and support.

ABSTRACT

Value management (VM) is an acknowledged technique used to optimise the performance of construction projects in most developed and developing countries. Research and improvement in the use of value-added techniques have continued to gain consideration worldwide as a result of the universal quest to reduce construction projects costs without sacrificing quality and performance of construction ventures. This research focuses on developing a roadmap for implementing VM in the Nigerian construction industry. Accordingly, the objectives of this research are to investigate the current value-added activities, to identify the barriers to VM applications, to identify the critical success factors for VM applications, to examine the relationship between critical success factors and the current value-added activities, and to develop a roadmap for the successful implementation of VM. Quantitative research approach was adopted for the study. A total of 465 questionnaires were distributed to practicing architects, quantity surveyors, builders, civil engineers, and services engineers, and a response rate of 74% was achieved. Data analysis techniques employed include: descriptive analysis using cross-tabulation, mean scores and relative importance index; normality test; reliability test; validity test using Kaiser-Meyer-Olkin (KMO) and Barlett's test of sphericity; factor analysis; and structural equation modelling. Findings reveal that although there is no formal implementation of VM in construction projects in Nigeria, at least 3 phases of VM have been adopted in the construction processes. Findings also demonstrate that VM practices in the Nigerian construction industry are hindered by lack of expertise, lack of awareness among clients, poor collaboration among stakeholders, resistance to accept new innovations, inadequate facilitation skills, lack of active involvement of clients and stakeholders, and absence of local VM guidelines. Consequently, drivers including multidisciplinary team, competent facilitators, effective communication among VM participants, ability to conduct VM workshops, commitment of all stakeholders to VM workshop, and support from government agencies would facilitate the successful implementation of VM. The roadmap established from the research results suggests four (4) requirements that necessitate the implementation of VM in the construction industry, namely "people-related factors", "government-related factors", "environment-related factors", and "information/methodology-related factors". The roadmap was validated by construction experts to confirm its suitability, usefulness, applicability and acceptance, and would form the basis to develop a VM manual or standard for the Nigerian construction industry.

ABSTRAK

Pengurusan nilai (PN) merupakan teknik yang diakui untuk mengoptimumkan pencapaian sesebuah projek pembinaan di kebanyakan negara maju dan membangun. Kajian dan penambahbaikan dalam penggunaan teknik tambah nilai terus mendapat perhatian di seluruh dunia akibat usaha universal untuk mengurangkan kos projek pembinaan tanpa mengorbankan aspek kualiti dan pencapaian projek. Kajian ini memberi fokus terhadap pembangunan pelan perlaksanaan PN dalam industri pembinaan di Nigeria. Oleh yang demikian, objektif kajian ini adalah untuk mengkaji aktiviti tambah nilai semasa, mengenal pasti halangan kepada aplikasi PN, untuk mengenal pasti factor kejayaan kritikal bagi perlaksanaan PN, mengkaji perkaitan antara faktor kejayaan kritikal dengan praktis semasa, dan untuk membangunkan pelan tindakan bagi perlaksanaan PN yang berjaya. Pendekatan kaedah kajian kuantitatif telah digunakan untuk kajian ini. Sebanyak 465 soal selidik telah diedarkan kepada arkitek, juru ukur bahan, jurubina, jurutera awam, dan jurutera kemudahan dengan kadar maklum balas sebanyak 74% telah dicapai. Kaedah analisis data yang digunakan meliputi deskriptif menggunakan *cross-tabulation*, skor min dan indeks kepentingan relatif, ujian normal, ujian kebolehpercayaan, ujian kesahihan menggunakan *Kaiser-Meyer-Olkin* dan *Barlett's test of sphericity*; analisis faktor dan pemodelan persamaan struktur. Dapatan ini mendapati bahawa walaupun PN tidak dilaksanakan secara formal dalam industri pembinaan di Nigeria, namun terdapat tiga fasa dalam PN yang telah digunakan dalam proses pembinaan. Dapatan juga menunjukkan bahawa amalan PN dalam industri pembinaan di Nigeria dihalang oleh kekurangan pakar, kurang kesedaran dalam kalangan pelanggan, kolaborasi yang lemah oleh pihak berkepentingan, rintangan untuk menerima inovasi baru, kepakaran fasilitator yang tidak mencukupi, kurang penyertaan yang aktif oleh pelanggan dan pihak berkepentingan, dan ketiadaan garis panduan PN tempatan. Sebagai kesan, pemacu seperti kepelbagaian disiplin, kompetensi fasilitator, komunikasi yang berkesan dalam kalangan pengamal PN, kebolehan untuk menjalankan bengkel PN, komitmen dari semua pihak berkepentingan, dan sokongan daripada agensi kerajaan akan membantu ke arah perlaksanaan PN yang berjaya. Pelan perlaksanaan yang diwujudkan daripada hasil kajian ini mencadangkan empat keperluan yang diperlukan untuk perlaksanaan PN dalam industry pembinaan iaitu faktor yang berkaitan dengan manusia, faktor yang berkaitan gengan kerajaan, persekitaran dan maklumat/metodologi. Pelan tindakan ini telah disahkan oleh pakar industri pembinaan untuk memastikan ia adalah bersesuaian, berguna, berkesan dan diterimapakai, dan menjadi asas untuk membangunkan manual atau standard PN bagi industri pembinaan di Nigeria.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

VM	-	Value Management
FA		Function Analysis
LCC	-	Life Cycle Cost
GDP	-	Gross Domestic Product
KM	-	Knowledge Management
CSF	-	Critical Success Factor
SEM	-	Structural Equation Modelling
EFA	-	Exploratory Factor Analysis
CFA	-	Confirmatory Factor Analysis
RM	-	Risk Management
VMW	-	Value Management Workshop
SPSS	-	Statistical Package for the Social Sciences
AMOS	-	Analysis of Moment Structures
NIA	-	Nigerian Institute of Architects
NIQS	-	Nigerian Institute of Quantity Surveyors
NIOB	-	Nigerian Institute of Building
NSE	-	Nigerian Society of Engineers
SF	-	Success Factor
SAVE	-	Society of American Value Engineers

FGN	-	Federal Government of Nigeria
MS	-	Mean Score Index
RII	-	Relative Importance Index
FAST	-	Function Analysis System Technique
QS	-	Quantity Surveyor
QSRBN	-	Quantity Surveyors Registration Board of Nigeria
FAST	-	Function Analysis System Technique
BOT	-	Build Operate Transfer
PPP	-	Public Private Partnership
CFI	-	Comparative Fit Index
GFI	-	Goodness-of-Fit Index
RMSEA	-	Root Mean Square Error of Approximation

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter provides the structure of the research which includes: the background of the study; problem statement; research questions; aim and objectives; brief methodology; definitions of terms; scope of the research; and structure of the thesis.

1.2 Background of the Study

The extent of economic growth in Nigeria from its independence in 1960 has been expanding and has become an important influence in Africa and the world. A number of considerable economic reforms and changes took place over the last nineteen years in the history of Nigeria. These changes were principally as a result of the transfer of power from the military regime to a civilian government in 1999. Thus, the economic reforms accelerated the recent growth and development across the nation (Isa *et al*., 2013). The infrastructure needed for socio-economic advancement is established by the construction industry which plays a significant role in the economic development of any country (Abdullah *et al*., 2004). In particular, the industry contributes to the socio-economic growth of developing countries (Rahim *et al*., 2014).

Consequently, the need for infrastructure, facilities, and buildings in Nigeria has prompted the growth of the nation's construction industry over the years.

The term 'construction' the world over is an activity which apparently plays an important task in the general economic development. The development of heavy engineering, civil (roads, railways, bridges etc.) and building (residential, institutional, commercial etc.) works are carried out by the construction industry, which is a viable sector in any nation's economy (Ogunsemi *et al*., 2008; Abdullah, *et al*., 2004). Hence, construction is one of the most essential activities of any economy because a large share of the country's resources are used in the construction of buildings (Mu'azu, 2002). In all nations, the construction industry is recognised to be the live wire of every economy and affects all forms of human endeavours (Ayangade, 2009). The Nigerian Construction Industry (NIC) parallels the global scenario.

Organised construction started in Nigeria in the 1930s and its activities increased steadily. The need for construction services and an increase in the construction activities was due to the 'oil boom' that followed about ten years after Independence in 1960 (NBS, 2015). Since 1960's and 70's, the foreign companies dominated the industry and brought about returns for government and jobs for its citizens. The construction industry across the world has witnessed great institutional and organisational transformation (Ibem *et al*., 2011). Therefore, notwithstanding a country's level of advancement and development, the construction industry plays a significant role in its economy. Hence, the continual growth of the industry could be made clear by the vitality of construction projects and the capacity to contain demographic changes.

Global Construction (2010) forecasted that Nigeria's construction growth would be one of the fastest of all markets by 2018, as a result of an increase in wealth and urbanisation emanating from the production of its oil. In 2015, Nigeria Gross Domestic Product (GDP) was 2.79% and the construction industry accounted for 4.35% of the GDP (NBS, 2016). The construction industry in Nigeria is made up of various stakeholders: the client; construction materials manufacturers; the craftsmen;

the contractors; consultants (Architects, Quantity Surveyors, Civil, Electrical, Mechanical and Structural Engineers, Builders, Estate Surveyors, Land Surveyors, Town Planners) and the end-users. The complex nature of the construction industry with various stakeholders and construction professionals may be responsible for the rapid transformation taking place in the Nigerian construction industry. Subsequently, all the construction actors and the workforce engage in a competitive environment to ensure that performance of projects is achieved and clients are satisfied. The clients in the construction industry could either be public organisations or private corporate bodies, however, the federal government is the major client of the Nigerian construction industry.

The introduction of new innovations, advancement in technology, complexity of construction projects and clients' growing needs are the reasons why the construction industry in the world keep changing (Oke and Ogunsemi, 2011, Ibem *et al*., 2011). Consequently, clients and stakeholders are now concerned with value philosophies to realise the best from their ventures, recognising and advancing new methods and approaches needed to upgrade the image of the construction industry (Ramly and Shen, 2012). Most countries [USA, UK, Australia, Hong Kong, China, Saudi Arabia and Malaysia] (Kissi *et al.,* 2015) with new value-added needs have embraced value-added innovations through value management (VM). According to Thiry (1997), other countries like Italy, Germany, France, South Korea, Kuwait, Denmark, Taiwan, South Africa, Hungary, and Canada have also embraced VM. As a result, Ramly and Shen (2012) capitulated that VM has been brought into the construction industry to attain the best value-for-money. Value-for-money has been described by Mohd Rahim *et al*. (2016) as the ideal combination of quality and whole life cost with the primary drive to satisfy the requirements of users. Although, according to Ong (2004), VM has extended the traditional emphasis on value-for-money to value for stakeholders, environment, systems, quality, social, ethics, etc.

Since the introduction of VM in the construction industry, the technique has gained popularity among industrial scholars and academics (Ramly *et al*., 2013), and its demand all over the world has been on the increase (Oke and Ogunsemi, 2011). Various terms such as value assessment, value review, value analysis, value

methodology, value engineering, value planning and value control have been associated with VM. According to Kissi *et al.* (2015) and Ong (2004), VM is synonymous with terms such as value engineering (Fan *et al*. 2013), and value analysis. Thiry (1997) advanced that VM encompasses value engineering, value analysis, value control, and other value techniques. The author further put forward that the agreement to use VM is basically to describe the incorporated widespread application of value techniques. Although many terms have been used, what is very important is the improvement of value without sacrificing the intended function. "VM is a multi-disciplinary, team oriented, structured, analytical and systematic analysis function, which seeks best value through the design and construction processes to meet the perceived needs of clients" (Jaapar *et al*., 2009). It is a well-thought-out framework that aids successful decision making relating to the 'best value'. In addition, VM is a process by which the project is assessed and analysed to have the best value-for-money by adhering to a certain methodology, the process being led by a trained facilitator (Rangelova and Traykova, 2014).

The concept of VM targets to optimise the value of construction projects by providing vital functions or elements at the lowest cost without giving up performance criteria. According to Hwang *et al.* (2014), VM has been acknowledged as a potent technique for attaining best value for construction clients. It has a tendency to evidently define roles and responsibilities of participants, resolve uncertainties and misperceptions in construction projects, and enhance relationships among stakeholders. Nonetheless, Thiry (1997) stated that VM can only exist when a goal needs to be accomplished or a problem needs to be resolved, when there is no goal or problem, there is no need to improve value. Hence, the need to identify the goals and problems by a VM team. In general, the taking part of key stakeholders in a VM workshop over a period of time in order to generate, classify, and develop functional requirements of projects with their associated costs is the primary objective of VM.

The realisation of better value-for-money, elimination of unnecessary costs, savings in project cost, understanding and evaluating project's objectives, improving team work and communication among construction stakeholders, and enhancing the function of projects are some of the benefits of VM.

1.3 Problem Statement

Nigeria, with the population of 182 million in 2017 (National Population Commission, 2017) is witnessing an unprecedented urbanisation, but the construction industry accounted for only 4.35% of the country's GDP in 2015 (NBS, 2016). Although, a number of significant and laudable economic reforms and changes took place over the last two decades, these extraordinary reforms and growth should not detract attention from the problems faced by the Nigerian construction industry. As a common norm, construction products in Nigeria have been procured by involving professionals to develop relevant briefs, designs, drawings and cost estimates, and then the contractor commence the construction work.

The construction activities in Nigeria are however increasingly being criticised for tasks that fail to meet stakeholder's anticipations, prospects, and expectations. The industry is faced with a lot of challenges and the most common are cost escalation (Balogun, 2005) and paucity of clients' awareness on value-added approaches. Poor communication and management of construction projects (Ojoko *et al*., 2016; Helen *et al*., 2015, Ameh *et al.*, 2010), inadequate training on value methodologies, and inability of construction professionals to define clients' objectives (Dim and Ezeabasili, 2015; Odediran and Windapo, 2014) are some of the constraints to successful project delivery in the Nigerian construction environment. A survey conducted on thirty-eight procurement practitioners in Nigeria in 2015 also revealed that, 76% of the participants confirmed the procurement systems are less effective in achieving success and performance of construction projects (Dim and Ezeabasili, 2015). Since there seems to be no formal procedure for either public or private firms to implement value-added assurance techniques in the Nigerian construction industry, these problems continue to occur. Hence, a decree was given by the Federal Government of Nigeria that the procurement of public facilities and assets must be through the use of value-added practices (Kolo and Ibrahim, 2010).

Value-added activities play a vital role in the delivery of projects in the construction industry. These activities highlight all ideas and methods that would make

sure that projects are delivered at the least likely cost while maintaining function and value. Kolo and Ibrahim (2010) expressed that VM has been a universally accepted methodology that can achieve value-added initiatives. Value-added activities are part of the processes of VM practice. Therefore, the existence of value-added activities in a construction environment will lead to the emergence and effective application of VM. Hence the need to investigate the current value-added activities, the barriers to VM application, and the critical success factors for VM application in the Nigerian construction industry.

In Nigeria, a study by Oke and Ogunsemi (2011) discovered that VM is currently only a part of quantity surveying academic curriculum of higher institutions and has not been incorporated in the Nigerian construction works. Sabiu and Agarwal (2016) and Akinpelu (2016) also agreed and submitted that the technique has not been formally practiced in Nigeria. Nonetheless, Kissi *et al.* (2015) advocated that VM offers a way out to the challenges of project delivery via the generation of an extensive variety of innovative alternatives. Therefore, the executors of construction projects ought to have the requirements and motivation needed to enhance project functions and objectives, reduce project cost, shorten completion time, and improve effective contract management skills. The ultimate goal of VM programmes is to optimise project functions as well as reduce the project cost. Hence, the need for a new optimisation technique to improve project performance in the construction industry.

According to Kissi *et al.* (2015), the Royal Institution of Chartered Surveyors (RICS) termed VM as one of the ten drivers in seeking to improve value-for-money. Considering the complex nature of construction projects, and the fact that identical construction projects are not the same, unnecessary costs are unavoidable. Thus, the need for identification and elimination of unnecessary costs. Ashworth and Hogg (2000), and Flanagan and Jewell (2005) reiterated that all clients expect the construction industry to deliver value-for-money. In a similar light, the Federal Government of Nigeria (FGN) has realised the need to improve service delivery by stipulating that procurement of public assets and services must go through the application of value-added standards and practices (Kolo and Ibrahim, 2010). Therefore, the use of value-added management systems and new innovations is

indispensable. Globally, VM seems to be an accepted approach for achieving value-for-money (Kolo and Ibrahim, 2010), and has recorded a lot of successes in both developed and developing countries. According to Flanagan and Jewell (2005), every decision should be driven by best value, and any system that provides an improved service life for lower whole life cost must be welcomed. Ellis *et al*. (2005) confirmed that when VM is properly implemented at the initial phase of a project, it could reduce cost by 10% - 25% on the proposed capital cost of construction projects. Experience has also indicated that the concept has led to cost saving of 5–10% (Zhang *et al*., 2009; Norton and McElligot, 1995), and 10-15% (Ashworth and Hogg, 2000) for a good number of construction projects. The Prime Minister of Malaysia as well submitted that the Malaysia's economy can be more competitive only if VM is applied at the early stages of a project (Abdul Rasak, 2011). Nonetheless, Oke and Ogunsemi, 2011 stated that VM has not formally been incorporated in the Nigerian construction industry and recommended the need for Nigerian clients to adopt the technique.

1.4 Main Research Question

What actions are needed for the successful implementation of VM in the Nigerian construction industry in order to reduce unnecessary project costs, shorten project completion time, optimise project functions and improve overall management skills?

1.4.1 Research Sub-Questions

I. What is the status quo of value-added activities in the Nigerian construction industry?

II. What are the barriers to VM application in the Nigerian construction industry?

III. What factors are critical to the successful application of VM in Nigerian construction industry?

IV. What is the influence of critical success factors on the current value-added activities?

V. What can be generated to assist stakeholders to implement VM in the Nigerian construction industry?

1.5 Aim and Objectives

The aim of the research is to develop a roadmap for VM implementation in the Nigerian construction industry.

Accordingly, the objectives of the research are:

I. To investigate the current value-added activities in the Nigerian construction industry.

II. To identify barriers to VM application in the Nigerian construction industry.

III. To identify critical success factors for VM application in the Nigerian construction industry.

IV. To examine the relationship between critical success factors and the current value-added activities in the Nigerian construction industry.

V. To develop and validate a roadmap for the successful implementation of VM in the Nigerian construction industry.

1.6 Methodology

The study adopted a quantitative research approach because of the nature of the research data. Self-administered questionnaires were distributed to 465 professionals which include: Quantity Surveyors; Architects; Builders; Civil Engineers and Services Engineers. The study had 93 variables, 5 responses per variable as recommended by most researchers for factor analysis (Pallant, 2005). While there is little agreement among authors on how large a sample should be, the recommendation is generally the larger the sample size, the better (Pallant, 2005).

The research instrument was divided into demographic and constructs measure. The demographic section was mainly nominal and ordinal responses, while the constructs measure had 5-point Likert scale for Sections B, C, and D. This was exclusively necessary in order to receive certain tendency from the respondents. The questionnaires were administered in Jos, Kaduna, and the Federal Capital Territory (Abuja). Abuja, being close to Jos and Kaduna cities, is the federal capital of Nigeria, which has a significant level of construction output.

The construction professionals were chosen from contracting, project management, consulting engineering, quantity surveying, consulting architects, and client organisations. 344 (73.98%) questionnaires were appropriately filled and returned. This sampling approach provided the prospect of meeting the target groups with a high response rate.

Normality test was first conducted using skewness and kurtosis to confirm the normality of the data collected. Tabish and Jha (2012) pointed out that, in order to establish the stability and comprehension of respondents, instrument reliability should be used to adequately measure the variables of a study. Hence, reliability test was conducted using the Cronbach's alpha coefficient to confirm the reliability of the data collected.

Exploratory Factor Analysis (EFA) using the Statistical Package for the Social Sciences (SPSS) version 25 software was also used to establish the structure of the measurement models. The Kaiser-Meyer-Olkin (KMO) and Barlett's test of sphericity were used to establish the instrument validity by assessing the sample adequacy and multivariate normality of the study variables. In addition, Structural Equation Modelling (SEM), using Confirmatory Factor Analysis (CFA) in AMOS software further validates the measurement models by indicating satisfactory goodness of fit among acknowledged determinants of this research.

In addition, cross-tabulation using SPSS version 25 was used to record the frequency or number of respondents that have specific characteristics. Subsequently, mean score and relative importance indexes were used to determine the frequency of occurrence, the degree of severity of respondents' responses, as well as the ranking of different research variables. To recapitulate, a validation by experienced construction experts was conducted via an online survey to confirm the applicability and acceptance of the research roadmap. An in-depth discussion of the methodology is presented in Chapter 3.

1.7 Terms and Definition

The terms used in this research are defined as follows:

Value: A product is said to have satisfying value if it has appropriate performance and cost. The value of a product can be increased in a number of ways: to increase the function while still maintaining the same cost; to decrease the cost while maintaining the same function; to increase the function and reduce the cost; to significantly increase the function with a little addition of cost; and to adequately decrease the cost with a little reduction of function (Liu, 2003). The Australian/New

Zealand Standard AS/NZS 4183 (1994) defined ‘value’ as the lowest cost to accurately accomplish a function according to expected levels of quality and performance.

Value Planning: Is carried out in the early part of a project prior to the decision to build or at briefing or outline design stage (Ashworth and Hogg, 2000). This affords the opportunity for practitioners and stakeholders to use the required value techniques to examine the objectives of projects.

Value Analysis: Is an organised approach to providing the necessary functions at the lowest cost. It identifies and eliminates unnecessary cost (Kelly and Male, 2005). It is a philosophy implemented by the use of a specific set of techniques, which has the purpose of efficient identification of unnecessary cost, i.e. cost that provides neither quality nor use nor life nor appearance nor customer features (Miles, 1961).

Value Engineering: Is a systematic approach to delivering the required functions at lowest cost without detriment to quality, performance and reliability (Connaughton and Green, 1996). Zimmerman and Hart (1982) defined value engineering as a proven management technique that uses a systematic approach to seek out the best function balance between the cost, reliability, and performance of a product or project.

Value Management: Is a service which maximises the functional value of a project by managing its development from concept to completion and commissioning through the audit (examination) of all decisions against a value system determined by the client (Kelly and Male, 2005). It is also a structured, organised team approach to identifying the functions of a project, product, or service with

recognised techniques and providing the necessary functions to meet the required performance at the lowest overall cost (SAVE International, 2001).

1.8 Scope of the Research

The focus of this research is on the Nigerian construction professionals. These professionals are primarily concerned with the delivery of construction projects. This research employed five (5) dynamic and active construction professionals as confirmed by Ogunsemi *et al*. (2008) and Adetola (2004). These include: architects; quantity surveyors; builders; civil engineers; and mechanical and electrical engineers (services engineers). The research covers construction professionals that carry out construction projects in Nigeria, and is focused on the current value-added activities in the construction industry. Their associated barriers and critical success factors are also investigated. Therefore, the scope of VM under study includes value-added activities, awareness, barriers, and drivers of VM applications.

The data for the study was obtained from construction professionals based in Abuja (federal capital territory of Nigeria), Jos (located at the middle belt of Nigeria and 273 kilometres from Abuja), and Kaduna (located at the north-western Nigeria, capital of Nigeria's former region, 1917- 1967 and 209 kilometres from Abuja). Abuja is the federal capital of Nigeria, located at the middle of the country. In 2015, Abuja experienced an annual growth rate of 35% (United Nations Report, 2015) with a significant level of construction output. All these cities have explosive population presence with high construction output because of a combination of factors; location, administrative, etc.

The research is limited to construction professionals that are registered with their professional bodies, and who operate in Nigeria. Figure 1.1 shows Abuja and neighbouring cities.

Figure 1.1 Map of Nigeria showing Abuja, Kaduna and Jos.

(Atlas Maps, 2017)

1.9 Structure of Thesis

The thesis is structured into six (6) chapters as summarised in Figure 1.2.

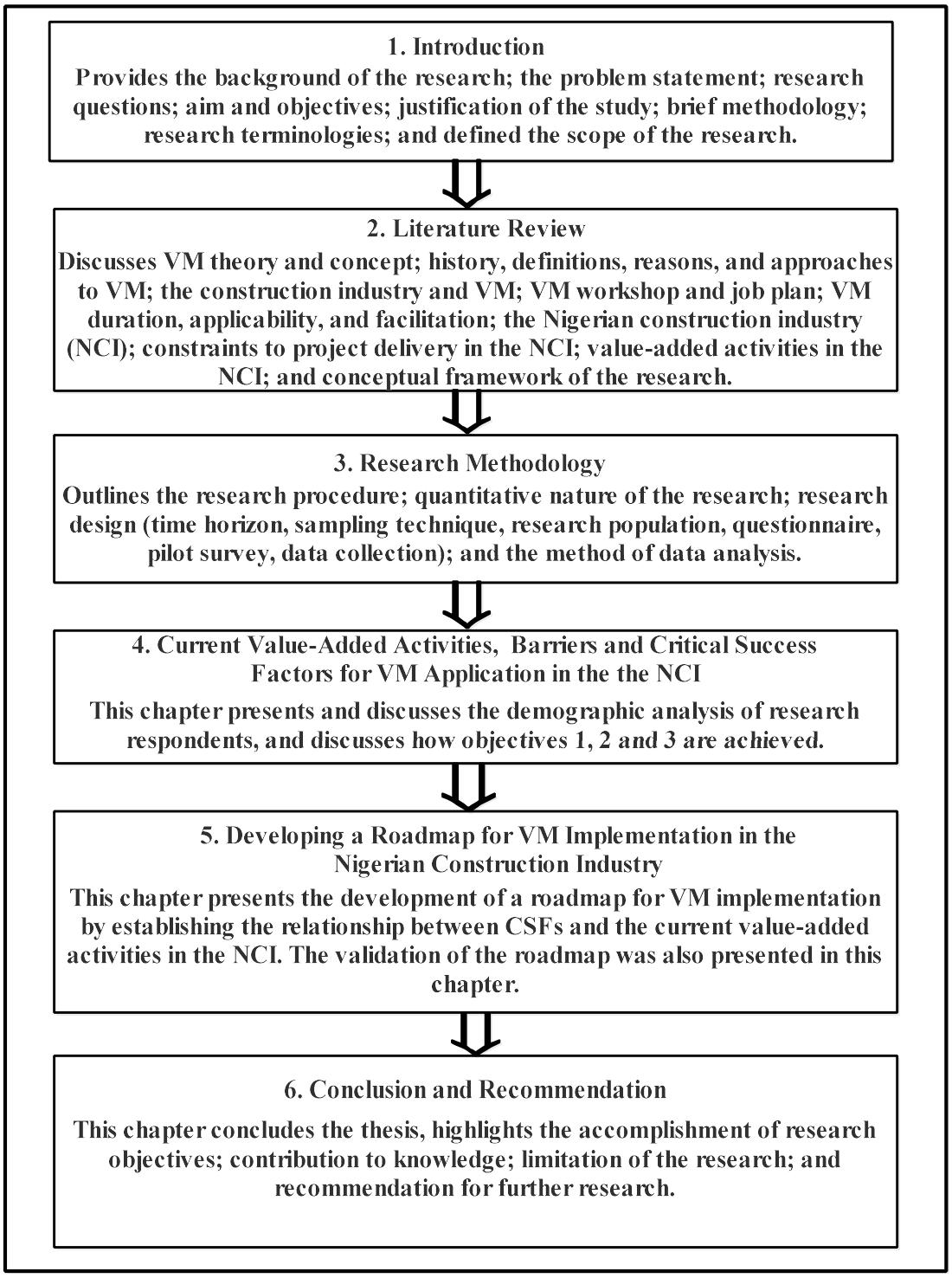

Figure 1.2 Structure of thesis

REFERENCES

Abd-Karim, S. B., Lowe, D. J., Abdul-Rahman, H., Wang, C., Yahya, I. A., and Shen, G.Q. (2011). Integrating Risk and Value Management using IRVM Workshops: Case Studies in Infrastructure Projects in UK, Scientific Research and Essays, 6(12), 2470-2479.

Abdullah, F., Chiet, C. V., Anuar, K., and Shen, T.T. (2004). An Overview on the Growth and Development of the Malaysian Construction Industry Workshop on Construction Contract Management 2004, Universiti Teknologi Malaysia.

Abdul-Rahman, H., Mohd Rahmin, F.A., Mohd Danuri, M.S. and Wah, L. W. A study on quality management during the pre-construction stage of design-and-build projects, Hughes, W., ed. (2008) *Proceedings of the inaugural construction management and economics 'Past, Present and Future' conference CME25*, 16-18 July 2007, University of Reading, UK. School of Construction Management and Engineering, University of Reading, Reading, 753-764.

Abdul-Razak, M. N. (2011). Transcript of Speech at the 12th Civil Service Premier Gathering, MAPPA XII.2011.Official Portal of the attorney General's Chamber of Malaysia.

Adetola, F.O. (2004). Contract Administration and Project Management. *The Nigerian Institute of Quantity Surveyors*, April Edition, Lagos.

Aibinu, A. A. and Jagboro, G.O. (2002). The Effects of Construction Delays on Project Delivery in Nigerian Construction Industry. *International Journal of Project Management*, 20, 593-599.

Aigbavboa, C., Oke, A. and Mojele, S. (2016). Contribution of Value Management to Construction Projects in South Africa. *5th Construction Management Conference*, 28th November-29th November, 2016, 226-234.

Akanni, P.O., Oke, A. E., and Akpomiemie, O.A. (2014). Impact of Environmental Factors on Building Project Performance in Delta State, Nigeria. *Housing and Building National Research Center (HBNRC) Journal*, 11, 91-97.

Akinpelu, A. (2016). Value Engineering/Management in Construction Project Implementation, Monitoring and Evaluation in Nigeria. NIQS Workshop: Budgeting & Capital Project Monitoring and Evaluation in an Era of Change, 1-17. Retrieved from niqs.org.ng/wp.../NIQS-WKSHOp-budgeting-capital-project-monitoring-evaluat.pdf August 30, 2017.

Alsolami, B., Embi, M.R. and Enegbuma, W.I. (2016). The Influence of Personal Factors on Hajj Crowd Perception among African Pilgrim Group in Mina. *Indian Journal of Science and Technology*, 9(46), 1-9.

Alsulamy, S., 2014. Developing a Performance Measurement Framework for Municipal Construction Project in Saudi Arabia, Edinburgh: Edinburgh Napier University.

AI-Yami, A. (2008). An Integrated Approach to Value Management and Sustainable Construction during Strategic Briefing in Saudi Construction Projects. PhD Thesis, Loughborough University.

Ameh, O. J., Soyingbe, A. A., and Odusami, K.T. (2010). Significant Factors Causing Cost Overruns in Telecommunication Projects in Nigeria. *Journal of Construction in Developing Countries*, 15(2), 49-67.

Anigbogu, N.A. and Ahmad, Z. B. (2009). Analysis of the Level of Use of Deconstruction, Its Benefits and Factors that Militate Against it in the Nigerian Construction Industry. *Nigerian Journal of Construction Technology and Management*, 10(1&2), 1-7.

Ashworth, A. and Hogg, K. (2000). Added Value in Design and Construction. England: Longman.

Assaf, S., Al-Musallami, A.I., and Al-Sughaiyer, M. (1996). Value Management in Public Construction Projects in Saudi Arabia. *Building Research and Information*, 24(3), 152-159.

Atlas Maps (2017). Available: www.ATLAS+MAPS+2017+NIGERIA&tbm Accessed [2017-08-25].

Atomen, E., Chuka, O.C., Emeka, I.K. and Samuel, O.S. (2015). Labour Productivity in Construction Industry in Nigeria: Case of Lagos and Port Harcourt, Southern Nigeria. *Civil and Environmental Research*, 7(4), 28-33.

Australian/New Zealand Standard AS/NZS 4183:1994 (1994). Value Management.

Awang, Z., Afthanorhan, A. and Asri, M.A.M. (2015). Parametric and Non Parametric Approach in Structural Equation Modeling (SEM): The Application of Bootstrapping. *Modern Applied Science*, 9(9), 58-67.

Awang, Z. (2015). SEM Made Simple: A Gentle Approach to Learning Structural Equation Modeling. Selangor, Malaysia: MPWS Rich Publication Sdn. Bhd.

Awodele, O. A., Ogunlana, S. O. and Motawa, I. (2010). Understanding and Managing Risks Necessary Condition for Success and Sustainability of Privately Finance Market Projects in Nigeria. *Proceedings of the Fourth International Conference for Post- graduate Researchers of the Built and Natural Environment* at Glasgow Caledonian University, Scotland.Baloi.pp 9-18.

Ayangade, J. A., Wahab, A. B., and Alake, O. (2009). An Investigation of the Performance of Due Process Mechanism in the Execution of Construction Projects in Nigeria. *Civil Engineering Dimension*, 11(1), 1-7.

Balogun, O.M. (2005). Clients' Perception on Measure of Indigenous Contractors Performance in the Construction Industry. The Professional Builders, Journal of Nigerian Institute of Building, 42-48.

Bello, W.A. and Odusami, K.T. (2009). Project Variables Influencing Contingency on Construction Contracts in Nigeria. *RICS COBRA Research Conference*, University of Cape Town, 10-11th September, 204-214.

Bollen, K. A. (1989). Structural Equations with Latent Variables. NY: Wiley.

Boynton, P. M. and Greenhalgh, T. (2004). Hands-On Guide to Questionnaire Research: Selecting, designing, and developing your questionnaire. *BMJ*, 328, 1312- 1315.

Browne, M. W., and Cudeck, R. (1993). Alternative Ways of Assessing Model Fit. In K. A. Bollen & J. S. Long (Eds.), Testing Structural Equation Models (pp. 136-162). Newsbury Park, CA: Sage.

Bryman, A. (1989) Research Methods and Organization Studies. London: Routledge.

Bryman, A. (2007). Barriers to Integrating Quantitative and Qualitative Research. *Journal of Mixed Methods Research*, 1(1), 8-22.

Bryne, B. M. (1994). Structural Equation Modeling with EQS and EQS/Windows. Thousand Oaks, CA: Sage Publications.

Byrne, B. M. (2001). Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming. Mahwah, NJ: Erlbaum.

Byrne, B. M. (2010). Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming, 2nd Edition. Routledge Taylor & Francis Group.

Chan, D.W.M. and Kumaraswamy,M.M. (1997). A Comparative Study of Causes of Time Overruns in Hong Kong Construction Projects, International Journal of Project Management, Vol. 15(1), pp. 55-63.

Chan, P. C. A., Ho, C. K. D. and Tam, C. M. (2001). Design and Build Project Success Factors: Multivariate Analysis. *Journal of Construction Engineering and Management*, 127:2(93), 93-100.

Chavan, A.J. (2013). Value Engineering in Construction Industry. International Journal of Application or Innovation in Engineering and Management, 2 (12), 18-26.

Cheah, C.Y.J. and Ting, S.K. (2005). Appraisal of Value Engineering in Construction in Southeast Asia. *International Journal of Project Management*, 23(2), 151-158.

Che Mat, M.M.H. (1999). The Challenges and Potential of Value Management in Local Construction Industry. *Jurnal Alam Bina*, 02(01), 41-47.

Che Mat, M.M.H. and Shah, Z.M. (2006). Value Management as an Effective and Efficient Tool for Space Management. Available: vm-academy.com/seminar_paper_01.pdf Accessed: [2016-04-10].

Chen, W. and Liao, S. (2010). A Job-Plan Based Performance Evaluation for Construction Value Engineering Study. *Journal of the Chinese Institute of Engineers*, 33(2), 317-333.

Chen, W. T., Chang, P. Y., and Huang, Y. H. (2010). Assessing the Overall Performance of Value Engineering Workshops for Construction Projects. *International Journal of Project Management,* 28(5), 514–527.

Cheung, E., Chan, A.P.C. and Kajewski, S. (2010). Suitability of Procuring Large Public Works by PPP in Hong Kong. *Engineering, Construction and Architectural Management*, 17(3), 292-308.

Chinedu, E.A., Titus, O.C. and Thaddeus, E.O. (2010). Achieving Vision 2020 in Nigeria: A Review of the Economic and Market-Oriented Business Reforms. *Journal of Sustainable Development in Africa*, 12(4), 58-71.

Chougule, A., Gupta, A.K., and Patil, S. (2014). Application of Value Engineering Technique to a Residential Building-Case Study. *International Journal of Innovative Research in Advanced Engineering,* 1(12), 115-118.

Coakes, S. J. and Ong, C., 2011. *SPSS Version 18.0 for Windows: Analysis Without Anguish*, Edition 1, New York City: John Wiley & Sons.

Connaughton, J.N. and Green, S.D. (1996). *Value Management in Construction: A Client's Guide*. Westminster-London: Construction Industry Research and Information Association (CIRIA).

Creswell, J.W. (2012). Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research, 4th edition. Boston, USA: Pearson Education Inc.

Crotty, M. (1998). The Foundations of Social Research: Meaning and Perspective in the Research Process. Sage publications, Thousand Oaks, CA.

Daniel, E.I., Pasquire, C. and Ameh, O.J. (2014). The Magic of the Last Planner System for Nigerian Construction. Production Planning and Control, Proceedings IGLC-22, June 2014 Oslo, Norway, p.605-616. Available: iglc.net/Papers/Details/1070/pdf [Accessed: 2016-04-12].

Dell I'sola, A.J. (1982), *Value Engineering in the Construction Industry* (3rd Ed). Newyork: Van Nortstrand Reinhold.

Desai, M. and Bhatt, R. (2013). Critical Causes of Delay in Residential Construction Projects: Case Study of Central Gujarat Region of India. *International Journal of Engineering Trends and Technology*, 4(4), 762-768.

Dim, N.U. and Ezeabasili, A.C.C. (2015). Strategic Supply Chain Framework as an Effective Approach to Procurement of Public Construction Projects in Nigeria. *International Journal of Management and Sustainability*, 4(7), 163-172.

Economic Planning Unit Malaysia (2011). Panduan Pelaksanaan Pengurusan Nilai (Value Management) dalam Program/Projek Kerajaan.

El-Alfy, A.E. (2010). Design of Sustainable Buildings through Value Engineering. *Journal of Building Appraisal,* 6(1), 69-79.

Ellis, C. W., Wood, D. G. and Keel, D. A. (2005). Value Management Practices of Leading UK Cost Consultants. *Construction Management and Economics*, 23, 483-493.

Elsayah, O.S. (2016). A Framework for Improvement of Contractor Selection Procedures on Major Construction Project in Libya. PhD thesis, School of

Engineering and the Built Environment, Edinburgh Napier University, Edinburgh.

Enegbuma, W.I., Aliagha, G.U. and Ali, K.N. (2015). Effects of Perceptions on BIM Adoption in Malaysian Construction Industry. *Jurnal Teknologi,* 77(15), 69–75.

Eshofonie, F.T. (2008). Factors Affecting Cost of Construction in Nigeria. Unpublished M.Sc. Thesis, Department of Building, University of Lagos, Nigeria.

Fadamiro, J.A. and Ogunsemi, D.R. (1996). *Fundamentals of Building Design, Construction and Materials,* 1st Edition. Fancy Publication Limited, Ile–Ife.

Fan, S., Shen, Q., Luo, X., and Xue, X. (2013). Comparative Study of Traditional and Group Decision Support-Supported Value Management Workshops. *J. Manage. Eng.*, 10.1061/(ASCE) ME.1943-5479 .0000151, 345–354.

FGN. (2009). Report of the Vision 2020. National Technical Working Group on Urban and Rural Development, Federal Government of Nigeria.

Flanagan, R. and Jewell, C. (2005). Whole Life appraisal for Construction. Oxford: Blackwell Publishing Ltd.

Fong, P.S., Shen, Q. and Cheng E.W.L. (2001). A framework for Benchmarking the Value Management Process. *Benchmarking: An International Journal*, 8(4), 306-216.

GDP per Capital by country (2017). Statistics from IMF, 1980-2022. Retrieved on 08/04/2018 from https://knoema.com/pjeqzh/gdp-per-capita-by-country-statistics-from-imf-1980-2022?country=Nigeria.

Ghashat, H. M., 2012. The Govermence of Libyan Pory: Determining a Framework for Successful Devolution, PhD thesis, Edinburgh: School of Engineering and the Built Environment, Edinburgh Napier University.

Gido, J. and Clements, J.P. (2003). Successful Project Management. New York: South- Western.

Gillham B. (2000). Developing A Questionnaire (Real World Research). London: Continuum.

Glastonbury, B. and MacKean, J. (1991). Survey Methods in Allan, G., Skinner, C. (Eds.). Handbook for Research Students in the Social Sciences. London: Falmer Press.

Global Construction (2010). Global construction 2020 and Global Opportunities. Global Construction Perspectives and Oxford Economics. Available: www.globalconstruction2020.com Accessed [2015-10-25].

Haaff, B. (2017). 8 Key Components of Technology Roadmaps. Retrieved from https://www.huffingtonpost.com.

Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998). Multivariate Data Analysis, 5th edition. Englewood Cliffs, NJ: Prentice Hall Publisher.

Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (2008). Multivariate Data Analysis, 7th edition. Upper Saddle River, New Jersey: Prentice Hall Publisher.

Hayles, C. S., Graham, M. & Fong, P. W. S. (2010). Value Management as a framework for embedding sustainable decision making. *Proceedings of ICE Municipal Engineer*, 163(1), 43-50.

Helen, B.I., Emmanuel, O.O., Lawal, A. and Elkanah, A. (2015). Factors Influencing the Performance of Construction Projects in Akure, Nigeria. *International Journal of Civil Engineering, Construction and Estate Management*, 3(4), 57-67.

Hu, L. T. and Bentler, P. M. (1995). Evaluating Model Fit. In R. H. Hoyle (Ed.), Structural Equation Modeling: Concepts, Issues, and Applications (pp. 76-99). Thousand Oaks, CA: Sage.

Hunter, K and Kelly, J. (2007). Efficiency in VM/VE Studies and the Pressure for Shorter Workshops. *Value World*, 30(1), 1-15.

Hwang, B.A., Lim, E.S.J. (2013). Critical Success Factors for Key Project Players and Objectives: Case study of Singapore. *Journal of Construction Engineering and Management, ASCE*, 136, 204-215.

Hwang, B. G., Zhao, X., and Toh, L. P. (2014). Risk Management in Small Construction Projects in Singapore: Status, Barriers and Impact. *Int. J. Project Manage.*, 32(1), 116–124.

Ibem, E.O., Anosike, M.N., Azuh, D. E., and Mosaku, T.O. (2011). Work Stress among Professionals in the Building Construction Industry in Nigeria. *Australasian Journal of Construction Economics and Building,* 11 (3), 45-57.

Isa, R. B., Jimoh, R. A. and Achuenu, E. (2013). An Overview of the Contribution of Construction Sector to Sustainable Development in Nigeria. *Net Journal of Business Management*, 1(1), 1-6.

Izam, Y. D. and Katun, I. (2009). An Appraisal of Project Needs of Public Buildings Clients in Nigeria. *Nigerian Journal of Construction Technology and Management,* 10(1&2), 107-111.

Jaapar, A. (2006). The Application of Value Management in the Malaysian Construction Industry and Development of Prototype Value Management Guidelines. Universiti Teknologi MARA, Shah Alam, Selangor.

Jaapar, A., Endut, I. R., and Bari, N.A.A. (2009). The Impact of Value Management Implementation in Malaysia. *Journal of Sustainable Development*, 2(2), 210-219.

Jaapar, A., Maznan, N.A., and Zawawi, M. (2012). Implementation of Value Management in Public Projects. *Procedia-Social and Behavioral Sciences*, 68, 77-86.

Jaapar, A., Takim, R., Ahmad Bari, N. A. and Endut, I. R. (2008). Value Management Guidelines for the Malaysian Construction Industry. *ALAM CIPTA*, *International Journal on Sustainable Tropical Design Research & Practice*, 3, 91- 98.

Jacoby, J. and Matell, M. (1971). Three-Point Likert Scales are Good Enough. J*ournal of Marketing research*, 3, 495-500.

Jambol, D.D. and Yusuf, M.I. (2004). An Appraisal of the National Construction Policy Goals on Major Stakeholders in the Construction industry. *Nigerian Journal of Construction Technology and Management*, 5, 63-69.

Jha, K. N. and Iyer, K. C. (2007). Commitment, Coordination, Competence and the Iron Triangle. *International Journal of Project Management*, 25(5), 527–40.

Joinson, A. N. and Reips, U. D. (2007). Personalized Salutation, Power of Sender and Response Rates to Web-Based Surveys. *Computers in Human Behavior*, 23(3), 275–285.

Kagioglou, M., Cooper, R., Aouad, G. and Sexton, M. (2000). Rethinking Construction: The Generic Design and Construction Process Protocol. *Engineering Construction and Architectural Management,* 7(2), 141-153.

Kasimu, M.A. (2012). Significant Factors that Causes Cost Overruns in Building Construction Projects in Nigeria. *Interdisciplinary Journal of Contemporary Research in Business*, 2, 775-780.

Kelly, J. (2007). Making Client Values Explicit in Value Management Workshops. *Construction Management and Economics*, 25, 435–442.

Kelly, J. and Male, S. (2002). A Technique for Understanding the Customer's Project Value Criteria. *Proceedings of SAVE International Conference*, Denver, Colorado, May 2002, 95 – 105.

Kelly. J. and Male, S. (1993). Value Management in Design and Construction: The Economic Management of Projects. Glasgow: E & FN Spon Inc.

Kelly, J. and Male, S. (2005). *Value Management in Design and Construction*. London & New York: E & FN SPON.

Kelly, J., Male, S. and Graham, D. (2004). Value Management of Construction Projects. Malden, USA: Blackwell Science Ltd.

Kim, S., Lee, Y., Nguyen, V.T. and Luu, V.T. (2016). Barriers to Applying Value Management in the Vietnamese Construction Industry. *Journal of Construction in Developing Countries*, 21(2), 55–80.

Kissi, E., Boateng, E. B. and Adjei-Kumi, T. (2015). Strategies for Implementing Value Management in the Construction Industry of Ghana. *Proceedings of the DII-2015 Conference on Infrastructure Development and Investment Strategies for Africa*, pp. 255–267.

Kline, R. B. (2010). Principles and Practice of Structural Equation Modelling, 3rd edition. New York: The Guilford Press.

Kolo, B.A. and Ibrahim, A.D. (2010). Value Management: How Adoptable is it in the Nigerian Construction Industry? In: Laryea, S., Leiringer, R. And Hughes, W. (Eds) *Conference Proceedings of West Africa Built Environment*, 653-663.

Kshirsagar, A.S., El-Gafy, M.A., and Abdelhamid, T.S. (2010). Suitability of Life Cycle Cost Analysis (LCCA) as Asset Management Tools for Institutional Buildings. *Journal of Facilities Management,* 8(30), 162-178.

Kunya, S. U., Hussaini, I.U., and Yusufu, M. I. (2005). Appraising Causes of Inflated Costs of Public Construction Projects in North East Nigeria. *Nigerian Journal of Construction Technology and Management*, 9(1):72-81.

Lai, N.K. (2006). Value Management in Construction Industry. MSc dissertation, Technology University Malaysia.

Leung, M.Y and Kong, S.S. (2008). Identifying Key Competencies of VM Facilitators based on International Standards. *International Value Management Conference*. Hong Kong.

Leye, S., Himmelspach, J. and Uhrmacher, A.M. (2009). A discussion on experimental model validation. *UKSim 2009: 11th International Conference on Computer Modelling and Simulation*. Pp 161-167.

Li, X. and Ma, W. (2012). Appraisal of Value Engineering Application to Construction Industry in China. Y.Zang (Ed.): *Future Wireless Networks and Information Systems*, LNEE 144: 303-311.

Lin, B. G., Sun, M., & Kelly, J. (2011). Identification of Key Performance Indicators for Measuring the Performance of Value Management Studies in Construction. *Journal of Construction Engineering and Management*, 137(9), 698–706.

Liu G. (2003). A Framework for Implementing Value Management in China's Construction Industry. Unpublished PhD Thesis, Department of Building and Real Estate, the Hong Kong Polytechnic University.

Luvara, V.G.M. and Mwemezi, B. (2017). Obstacles Against Value Management Practice in Building Projects of DuresSalaam Tanzania. *International Journal of Construction Engineering and Management*, 6(1), 13-21.

Mahmood, W.Y.W., Mohammed, A.H., Misnan, M.S., Yusof, Z.M. and Bakri, A. (2006). Development of Quality Culture in the Construction Industry. *In Proceedings, International Conference on Computing and Informatics (ICCI 2006)*, Universiti Utara Malaysia & IEEE Malaysia Kuala Lumpur.

Majid, M. and McCaffer, R. (1997). Assessment of Work Performance of Maintenance Contractors in Saudi Arabia. *Journal of Management in Engineering*, 13(5), 91–91.

Male, S., Kelly, J., Fernie, S., Grongvist, M., and Bowles, G. (1998). The Value Management Benchmark: Research Result of an International Benchmarking Study, Thomas Telford, London.

Mansfield, N. R., Ugwu, O.O. and Doran, T. (1994). Causes of Delay and Cost Overruns in Nigerian Construction Projects. *International Journal of Project Management*, 12(4), 254-260.

Maurer, J. H. (1996). Key Factors in Starting and Maintaining a VA/VE Continuous Improvement Program. Proc., *SAVE Int. 36th Conf*., California, Society of Value Engineers (SAVE International), Ohio, 147–152.

Miles, L. D. (1961). Techniques of Value Analysis and Engineering. Newyork: McGraw-Hill.

Mohd Rahim, F.A., Muzafar, S.A., Zakaria, N., Zainon, N., and Johari, P.A. (2016). Implementation of Life Cycle Costing in Enhancing Value-for-money of Projects. *International Journal of Property Science,* 6(1), 39- 48.

Mohammed, A.K. and Isah, A.D. (2012) Causes of Delay in Nigeria Construction Industry. *Interdisciplinary Journal of Contemporary research in business*, 4(2), 785-794.

Molwus, J.J., Ewuga, D.J. and Akande, E.M. (2011). Structural Equation Modelling (SEM): A Viable Technique with Caution for Construction Management Research. *Nigerian Journal of Construction Technology and Management,* 12(1), 55-63.

Morgan, D. L. (2007). Paradigms Lost and Pragmatism Regained Methodological Implications of Combining Qualitative and Quantitative Methods. *Journal of mixed methods research*, 1(1), 48-76.

Muazu, D. A. (2002). The Role of the Professional Builder in the Nigerian Construction Industry. *ATBU journal of Environmental Technology*, 1(1), 29-31.

Muhwezi, L., Acai, J. and Otim, G. (2014). An Assessment of the Factors Causing Delays on Building Construction Projects in Uganda. *International Journal of Construction Engineering and Manage*ment, 3(1), 13-23.

Musa, M.M., Amirudin, R., Sofield, T. and Musa, M.A. (2015). Influence of External Environmental Factors on the Success of Public Housing Projects in Developing Countries. *Construction Economics and Building*, 15(4), 30-44

National Population Commission (2017). Available: www.population.gov.ng/nigerias-population-now-182-million-npc/ Accessed: [2017-11-05].

Nawi, M.N.M., Lee, A., Kamar, K.A.M. and Hamid, Z.A. (2011). A Critical Literature Review on the Concept of Team Integration in Industrialised Building System (IBS). Malaysia Construction Research Journal (MCRJ), 9(2), 1-18.

Neuman, W. L. (2011). Social Research Methods: Quantitative and Qualitative Approaches (7th ed.), Pearson.

Nigerian Bureau of Statistics (2010). Nigerian Gross Domestic Product Report. Available: www.nigerianstat.gov.ng_ Accessed: [2015-01-08].

Nigerian Bureau of Statistics (2015). Nigerian construction sector summary report 2010-2012. Retrieved from www.nigerianstate.gov.ng. Accessed: [2016-08-15].

Nigerian Bureau of Statistics (2016). Nigerian Gross Domestic Product Report. Issue 10, Quarter two. Available from www.nigerianstat.gov.ng/ Accessed: [2016-11-05].

Norman, G.R. and Streiner, D.L. (2003). PDQ Statistics, 3rd edition. B C Decker Inc.

Norton, B. R. (1992) in Akinpelu, A. (2017). Value Engineering/Management in Const ruction Project Implementation, Monitoring and Evaluation in Nigeria. NIQS Workshop: Budgeting and Capital Project Monitoring and Evaluation in an Era of Change. Retrieved from niqs.org.ng/wp.../NIQS-WKSHOp-budgeting-capital-project-monitoring-evaluat.pdf on 11/01/2018.

Norton, B. R. and McElligott, W. C. (1995). *Value Management in Construction, a Practical Guide*. London: Macmillan Press Ltd.

Norušis, M. (2007). *PASW Statistics Base 18*, Chicago: Polar Engineering and Consulting.

NSW Government. (1993). Capital Project Procurement Manual. New South Wales Government, Sydney.

Nwosu, C.C.C. (2003). High Cost of Building in Nigeria: Factors Responsible and Remedies. *The Quantity Surveyor*, *Journal of the Nigerian Institute of Quantity Surveyors*, 44 (3), 18-27.

Odediran, S.J. and Windapo, A.O. (2014). A Systematic Review of Factors Influencing the Cost Performance of Building Projects *In*: Laryea, S. and Ibem, E. (Eds) *Proceedings 8th Construction Industry Development Board (CIDB) Postgraduate Conference*, 10-11 February 2014, University of the Witwatersrand, Johannesburg, South Africa, 501-520.

Odeyinka, H. A. (2006). The Role of Quantity Surveyor in Value Management. *22nd Biennial Conference on Quantity Surveying in the 21st Century Agenda for the Future*. Nigerian Institute of Quantity Surveyors.

Odeyinka, H.A. and Yusif, A. (1997). The Causes and Effects of Construction Delays on Completion Cost of Housing Projects in Nigeria. *Journal of Financial Management of Property and Construction*, 2, 31–44.

Odusami, K.T. and Iyagba, R.R. (2001). The most suitable Professional for Team Leadership on Building Projects as perceived by the Professionals in the Construction Industry. *The Professional Builder*, July Edition, 64 – 73.

Office of Government Commerce [OGC] (2007). Value Management in Construction: Case Studies. Office of Government Commerce, Trevelyan House, 26 - 30 Great Peter Street, London SW1P 2BY. Available: www.ogc.gov.uk

Ogunsemi, D.R., Oyediran, O.S., and Ekundayo, D.O. (2008). Construction Professionals and Project Management Competencies in Nigeria. *Journal of Construction*, 1(2). Available: www.constr@crown.co.za Accessed: [2016-12-10].

Ojoko, E.O., Tanko, B.L., Jibrin, M., Ojoko, O. and Enegbuma, W.L. (2016). Project Delay Causes and Effects in the Construction Industry. *In IGCESH. Proceedings of the 6th International Graduate Conference on Engineering, Science and Humanities*, 15th-17th August, 2016, p.221-223.

Oke, A. E. and Ogunsemi, D. R. (2011). Value Management in the Nigerian Construction Industry: Militating Factors and the Perceived Benefits. *Second International Conference on Advances in Engineering and Technology*, 353-359.

Okpala, D. and Aniekwu, A. (1988). Causes of High Costs of Construction in Nigeria. *Journal of Construction Engineering and Management*, 114(2), 233–244.

Olanrewaju, A.A. (2008). Assessing the Practice and Prospects of Value Management in the Nigerian Construction Industry. An MSc Thesis, International Islamic University, Malaysia.

Olanrewaju, A.A. (2013). A Critical Review of Value Management and Whole Life Costing on Construction Projects. *International Journal of Facilities Management*, 4(1), 1-12.

Olanrewaju, A. L. and Khairuddin, A. R. (2007). Value Management: New Direction for Nigerian Quantity Surveyors. *Proceedings of a conference on Leading through innovation. Malaysian Institute of Quantity Surveyors*. Pp 102-109.

Olaseni, M. and Alade, W. (2012). Vision 20:2020 and the Challenges of Infrastructural Development in Nigeria. *Journal of Sustainable Development*, 5(2), 63-76.

Olawumi, T.O., Akinrata, E.B. and Arijeloye, B.T. (2016). Value Management-Creating Functional Value for Construction Project: An Exploratory Study, *World Science News*, 54, 40-59.

Olubodun, F., Kangwa, J., Oladapo, A., and Thompson, J. (2010). An Appraisal of the Level of Application of LCC within the Construction Industry in the UK. *Structural Survey*, 28(4), 254-265.

Omoregie, A. and Radford, D. (2006). Infrastructure Delays and Cost Escalation: Causes and Effects in Nigeria. *Proceeding of Sixth International Postgraduate Research Conference*, Delft University of Technology and TNO, Netherlands. 3rd-7th April 2006. pp 79-93.

Omoregie, A. and Radford, D. (2006). Infrastructure Delays and Cost Escalation: Causes and Effects in Nigeria. *Proceeding of Sixth International Postgraduate Research Conference*, Delft University of Technology and TNO, the Netherlands. 3rd to 7th April, 2006.

Omotola, A., Oyedale, T. and Fagbemi, K. (2017). A Review of Public Procurement Act and its Implementation in Ondo State, Nigeria In: Laryea, S. and Ibem, E. (Eds) *Procs 7th West Africa Built Environment Research (WABER) Conference*, 16-18 August 2017, Accra, Ghana, 91-106.

Ong. H. T. (2004). Quality and Value Management in Construction. In *International Conference on Managing Excellence in Construction*, China.

Otunola, A.T. (2008). Construction Cost and Time Overrun-A Builder's Perception of Contributory Factors, *The Professional Builder, Journal of the Nigerian Institute of Building,* September, 2008.

Oyegoke, A. S., Dickinson, M., Malik, M. A., McDermott, P. and Rowlinson, S. (2009). Managing Projects in Construction Project Procurement Routes: An In-Depth Critique. *International Journal of Business*, 2(3), 338-54.

Pallant, J. (2005). SPSS Survival Manual: A Step by Step Guide to Data Analysis for Windows (version 12), 2nd edition. Australia: Allen & Unwin.

Palmer, A., Kelly, J., and Male, S. (1996). Holistic Appraisal of Value Engineering In Construction in United States. *ASCE Journal of Construction Engineering and Management,* 122(4), 324-328.

Pasquire, C. and Maruo, K., (2001). A Comparison of Value Management Methodology in the UK, USA and Japan. *Journal of financial Management of Property and Construction*, 6(l), 19-29.

Perera, S., Hayles, C.S. and Kerlin, S. (2011). An Analysis of Value Management in Practice: The Case of Northern Ireland's Construction Industry. *Journal of Financial Management of Property and Construction*, 16 (2), 94-110.

Phyo, W.W.M. and Cho, A.M. (2104). Awareness and Practice of Value Engineering in Myanmar Construction Industry. *International Journal of Scientific Engineering and Technology Research*, 3(10), 2022-2027.

Powell, R.R. and Silipigni, L.C. (2004). Basic Research Methods for Librarians, 4th edition. London, 4th edition. Westport, Connecticut: Libraries unlimited.

Rahim, F.A., Muzaffar, S.A., Mohd Yusoff, N.S., Zainon, N. and Wang, C. (2014). Sustainable Construction through Life Cycle Costing. *Journal of Building Performance,* 5(10), 84-94.

Rahman, I.S., Memon, A.H., Rahman, I.S., Abdul-Azis, A.A., and Abdullah, N.H. (2013). Modeling Causes of Cost Overrun in large Construction Projects with Partial Least Square-SEM Approach: Contractor's Perspective. *Research Journal of Applied Sciences, Engineering and Technology*, 5(6), 1963-1972.

Ramly, Z.M. and Shen, G. Q. (2012). Value Management in Malaysia: Past, Present and Future. *Proceedings of the International Conference on Value Engineering and Management* 'Innovation in value methodology' 6th-7th December, 2012.The Hong Kong Polytechnic University Hong Kong, 105-110.

Ramly, Z.M., Shen, G.Q. and Yu, A.T.W. (2015). Critical Success Factors for Value Management Workshops in Malaysia. *Journal of Management in Engineering*, 31, 1-9.

Rangelova, F. and Traykova, M. (2014). Value Management in Construction Industry. *First Scientific-Applied conference With International Participation 'Project Management in Construction'*. University of Architecture, Civil Engineering and Geodesy, Sofia, Bulgaria, Europe. 4-5 December, 2014.

Rockart, J. F. (1979). Chief Executives define their own Data Needs. *Harvard Business Review,* 57(2): 81–93.

Rowley, J. (2014). Designing and Using Research Questionnaires. *Management Research Review*, 37(3), 308-330.

Sabiu, B.Y. and Agarwal, V.C. (2016). Minimizing the Factors Hindering the Practice of Value Management in the Nigerian Construction Industry. *International Journal of Science, Engineering and Technology Research*, 5(10), 2974-2978.

Saifulnizam, M., Coffey, V. and Preece, C.N. (2011). Value Management: An Extension of Quantity Surveying Services in Malaysia. In Christopher, Preece & Syazli, fathi (Eds) *International construction Business and Management Symposium*. Queensland University of Technology, Brisbane Australia, 2011. Available: http://eprints.qut.edu.au/47073/ Accessed: [2016-01-11].

Salleh, R. (2009). Critical Success Factors of Project Management for Brunei Construction Projects: Improving Project Performance. PhD Thesis, School of Urban Development, Queensland University of Technology.

Salvatierra-Garrido, J. and Pasquire, C. (2011). Value Theory in Lean Construction. *Journal of Financial Management of Property and Construction*, 16(1), 8-18.

Saraph, J. V., Benson, P. G. and Schroeder, R. G. (1989). An Instrument for Measuring the Critical Factors of Quality Management. *Decision Sciences,* 20(4): 810–29.

Saraph, J.V., Benson, P.G., and Schroeder, R.G. (1989). An Instrument for Measuring the Critical Factors of TQM. *Decision Sciences*, 20, 810-829.

Sargent, R.G. (1999). Validation and Verification of Simulation Models. *Proceedings of the 1999 Winter Simulation Conference* P. A. Farrington, H. B. Nembhard, D. T. Sturrock, and G. W. Evans, eds. Pp 39-48.

Saunders, M., Lewis P. and Thornhill, A. (2009). Research Methods for Business Students. London: Financial Times Prentice Hall Inc.

SAVE International (2001). Value Methodology Standard.

SAVE International (2007). Value Methodology Standard

SAVE International (2008). Value Management.

Shen, Q. P. (1993). A Knowledge-Based Structure for Implementing Value Management in the Design of Office Buildings. PhD Thesis, Univ. of Salford, Published by the British Library, Document Supply Centre, U.K.

Shen, Q.P. (1997). Value management in Hong Kong's Industry: Lessons Learned. *SAVE International Conference Proceedings*, SAVE International, Dayton, Ohio, 260-265.

Shen, Q. P., and Liu, G. (2003). Critical Success Factors for Value Management Studies in Construction. *ASCE Journal of Construction Engineering and Management*, 129(5), 485-491.

Shen, Q. and Liu, G. (2004). Applications of Value Management in the Construction Industry in China. *Engineering, Construction and Architectural Management*, 11(1), 9-19.

Shen, G.Q. and Yu, A.T. W. (2012). Value Management: Recent Developments and Way Forward. *Construction Innovation*, 12(3), 264-271.

Short, C. A., Barett, P., Dye, A. and Sutrisna, M. (2008). Impacts of Value Engineering on Five Capital Arts Projects. *Construction Management and Economics,* 35(3), 287-315.

Spaulding, W. M., Bridge, A., and Skitemore, M. (2005). The Use of Function Analysis as the Basic of Value Management in the Australian Construction Industry. *Construction Management and Economics*, 23(7), 723-731.

Steiger, J. H. (1990). Structural Model Evaluation and Modification: An Interval Estimation Approach. *Multivariate Behavioural Research*, 25, 173-180.

Steiger, J. H. (2007). Understanding the limitations of Global Fit Assessment in Structural Equation Modeling. *Personality and Individual Differences*, 42, 893-898.

Steiger, J. H. and Lind, J. C. (1980). Statistically Based Tests for the Number of Factors. Paper Presented At The Annual Spring Meeting of the Psychometric Society, Iowa City, IA.

Sterner, E. (2002). Green Procurement of Buildings: A Study of Swedish Clients' Considerations. *Journal of Construction Management and Economics*, 20:21-30.

Tabish, S.Z.S. and Jha, K.N. (2012). Success Traits for a Construction Project. *Journal of Construction Engineering Management*, 138 (10), 1131-8.

Taiwo, D. O., Yusoff, N. and Aziz, N. A. (2018). Housing Preferences and Choice in Emerging Cities of Developing Countries. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, 10 (1), 48-58.

Tashakkori, A. and Teddlie, C. (1998). Mixed Methodology: Combining Qualitative and Quantitative Approaches. Thousand Oaks, CA: Sage.

Teerajetgul, W., Charoenngam, C. and Wethyavivorn, P. (2009). Key Knowledge Factors in Thai Construction Practice. *Int. J. Project Manag*., 27, 833-839.

The Institute of Value Management. What is value management? (2008). Available: http://www.ivm.org.uk/what_vm.htm Accessed: [2015-09-13].

Thiry, M. (1997). Value Management Practice. Philadelphia: PMI Publication.

United Nations Report (2015). UN Habitat Report. Available: https://sustainabledevelopment.un.org/__Accessed: [2016-01-12].

Wahab, A.B. and Alake, O. (2007). Effects of Delay on Construction Projects in Nigeria. *Built Environment Journal*, 3(1), 21-27.

Whyte, A. and Cammarano, C. (2012). Value Management in Infrastructure Projects in Western Australia: Techniques and Staging In: Smith, S.D (Ed) *Procs 28th Annual ARCOM Conference,* 3-5 September 2012, Edinburgh, UK, Association of Researchers in Construction Management, 797-806.

Wimmer, R.D. and Dominick, R.G. (2000). Mass Media Research: An Introduction. Toronto: Wads Worth Publishing.

Wong, P.S.P. and Cheung, S. (2005). Structural Equation Model of Trust and Partnering Success. *ASCE Journal of Management in Engineering*, 21(2), 70-80.

Yang, J., Shen, G.Q., Ho, M., Drew, D.S. and Chan, A.P.C. (2009). Exploring Critical Success Factors for Stakeholder Management in Construction Projects. *Journal of Civil Engineering and Management,* 15(4), 37–348.

Yit, F.C. (2012). An Exploratory Study on the Implementation of Value Management among Engineering Professionals in the Klang Valley. MSc Thesis submitted to the Graduate School of Business, University of Malaya, Malaysia.

Yu, T. W., Shen, Q. P., Kelly, J. and Hunter, K. (2006). Investigation of Critical Success Factors in Construction Project Briefing by way of Content Analysis. *Journal of Construction Engineering and Management,* 132(11): 1178–1186.

Zainul Abidin, N. and Pasquire, C. L. (2005). Delivering Sustainability through Value Management: Concept and Performance Overview. *Engineering, Construction and Architectural Management*, 12(2), 168-180.

Zainul Abidin, N. and Pasquire, C. L. (2007). Revolutionize Value Management : A Mode towards Sustainability. *International Journal of Project Management*, 25, 275-282.

Zhang, X., Mao, X., and AbouRizk, S.M. (2009). Developing a Knowledge Management System for Improved Value Engineering Practices in the Construction Industry. *Automation in Construction*, 18, 777–789.

Zhao, X., Hwang, B. G., and Low, S. P. (2013). Developing Fuzzy Enterprise Risk Management Maturity Model for Construction Firms. *J. Constr. Eng. Manage*., 10.1061/(ASCE)CO.1943-7862.0000712, 1179–1189.

Zimmerman, L. W. and Hart, G. D. (1982). *Value engineering: A Practical Approach for Owners, Designers and Contractors*. Newyork: Van Nostrand Reinhold Company Inc.