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

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To GOD, who has compassionately blessed me, and to my beloved wife, dad, mum,
Lois, Joanna, and Judith,
Thank You!
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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 mengoptimalkan pencapaian sesuatu 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 factor 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 Bartlett’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, kepakan fasilitator yang tidak mencukupi, kurang penyertaan yang aktif oleh pelanggan dan pihak berkepentingan, dan ketiadaan garis panduan PN tempatan. Sebagai kesan, pemacu seperti kesejahteraan 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 dari hasil kajian ini mencadangkan empat keperluan yang diperlukan untuk perlaksanaan PN dalam industry pembinaan iaitu faktor yang berkaitan dengan manusia, faktor yang berkaitan dengan kerajaan, persekitaran dan maklumat/metodologi. Pelan tindakan ini telah disahkan oleh pakar industri pembinaan untuk memastikan ia adalah bersesuaian, berguna, berkesan dan diterimpakai, dan menjadi asas untuk membangunkan manual atau standard PN bagi industri pembinaan di Nigeria.
# TABLE OF CONTENT

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td></td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td></td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td></td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td></td>
<td>v</td>
</tr>
<tr>
<td>ABSTRAK</td>
<td></td>
<td>vi</td>
</tr>
<tr>
<td>TABLE OF CONTENT</td>
<td></td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td></td>
<td>xv</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td></td>
<td>xviii</td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS</td>
<td></td>
<td>xxi</td>
</tr>
</tbody>
</table>

1 INTRODUCTION 1

1.1 Introduction 1

1.2 Background of the Study 1

1.3 Problem Statement 5

1.4 Main Research Question 7

1.4.1 Research Sub-Questions 7

1.5 Aim and Objectives 8

1.6 Methodology 9

1.7 Terms and Definition 10

1.8 Scope of the Research 12
2 LITERATURE REVIEW

2.1 Introduction 15

2.2 Function, Quality, Cost, and Value 15
  2.2.1 Function 16
  2.2.2 Quality 16
  2.2.3 Cost 16
  2.2.4 Value 16

2.3 Historical Development of Value Management 17

2.4 Definitions of Value Management 20

2.5 The Components of Value Management 23
  2.5.1 System 23
  2.5.2 Multi-disciplinary Team 23
  2.5.3 Client Value System 24
  2.5.4 Job Plan 25
  2.5.5 Life Cycle Cost 28

2.6 Reasons for Value Management 28
  2.6.1 Development of Systematic, Innovative and Creative Ideas 28
  2.6.2 Removal of Unnecessary Costs 29
  2.6.3 Quality Optimisation and Effective Use of Time 29
  2.6.4 Development of Teamwork 29
  2.6.5 Establishment of Client’s needs 30
  2.6.6 Effective Communication among Stakeholders 30

2.7 Approaches to Value Management 31
  2.7.1 The Charette 31
  2.7.2 The 40 Hour Study 32
  2.7.3 Value Management Audit 32
  2.7.4 Contractor’s Change Proposal 32
2.8 The Construction Industry and Value Management 33
2.9 Value Management Workshop in the Construction Industry 38
  2.9.1 Pre-Workshop 38
  2.9.2 Workshop 38
    2.9.2.1 Information Phase 39
    2.9.2.2 Function Analysis 39
    2.9.2.3 Creativity 39
    2.9.2.4 Evaluation 40
    2.9.2.5 Development 40
    2.9.2.6 Presentation 40
  2.9.3 Post-Workshop 41
2.10 Value Management Job Plan 42
2.11 Duration of a Value Management Workshop 45
2.12 Applicability of Value Management 46
2.13 Value Management Facilitation 46
  2.13.1 External and Internal Facilitation 47
  2.13.2 Competencies of Value Management Facilitators 48
2.14 Strategies for Value Management Implementation 50
2.15 Success Factors for Value Management Application 52
2.16 Barriers to Value Management Application 55
2.17 The Nigerian Construction Industry 57
2.18 The Nigerian Construction Professionals 61
2.19 Constraints to Project Delivery in the Nigerian Construction Industry 62
2.20 Value-Added Activities in the Nigerian Construction Industry 65
2.21 Conceptual Framework of the Research 67
2.22 Summary 70
3 RESEARCH METHODOLOGY

3.1 Introduction 71

3.2 Research Philosophy, Approach and Techniques 72

3.3 Nature of Research 73

3.4 Quantitative Research 74

3.5 Research Procedure 75

3.6 Justification of Research Method 77

3.7 Research Design 77

3.7.1 Time Horizon 79

3.7.2 Sampling Technique 79

3.7.3 Research Population 80

3.7.4 The Questionnaire 82

3.7.5 Questionnaire Design 82

3.7.6 Pilot Survey 88

3.7.7 Sample Size collection 90

3.7.8 Data Collection 91

3.8 Data Analysis 92

3.8.1 Validity and Reliability Test 92

3.8.2 Descriptive Statistics 93

3.8.3 Cross-tabulation and Chi-square Test 94

3.8.4 Mean Score and Relative Importance Index 94

3.8.5 Factor Analysis 95

3.8.5.1 Exploratory and Confirmatory Factor Analyses 96

3.8.6 Structural Equation Modeling 97

3.8.6.1 Exceptionality of Structural Equation Modeling 99

3.8.6.2 Goodness of Fit Statistics for Structural Equation Modeling 99

3.9 Validation of the Roadmap 102

3.10 Summary 104
CURRENT VALUE-ADDED ACTIVITIES, BARRIERS AND CRITICAL SUCCESS FACTORS FOR VALUE MANAGEMENT APPLICATION IN THE NIGERIAN CONSTRUCTION INDUSTRY

4.1 Introduction

4.2 Demographic Analysis
   4.2.1 Respondents’ Working Experience in the Construction Industry
   4.2.2 Respondents’ Specialisations
   4.2.3 Role of Respondents’ Organisation in the Construction Industry
   4.2.4 Respondents’ Perception on Value Management
   4.2.5 Respondents’ Familiarity on Value Management
   4.2.6 Respondents’ Formal Training on Value Management
   4.2.7 Respondents’ Participation in Value Management Workshop
   4.2.8 Respondents’ Role in Value Management Workshop

4.3 Current Value-Added Activities
   4.3.1 Outliers and Multicollinearity of VM Attributes
   4.3.2 Test of Normality on Current Value-Added Attributes
   4.3.3 Reliability Test for Current Value-Added Attributes
   4.3.4 Factor Analysis of the Current Value-Added Activities
   4.3.5 Phases of Current Value-Added Attributes
   4.3.6 Construction Professionals Perception on the Current Value-Added Activities
4.3.7 Prominence of the Value-Added Activities in the Construction Industry 127
4.3.8 Importance of Value-Added Activities in the Nigerian Construction Industry 129
4.3.9 Framework for the Current Value-Added Activities in the Nigerian Construction Industry 132

4.4 Barriers to VM Application in the Nigerian Construction Industry 133
4.4.1 Test of Normality on Barrier Attributes 134
4.4.2 Instrument Reliability Test for Barrier Attributes 135
4.4.3 Factor Analysis of Barriers to VM Application 136
4.4.4 Perception of Construction Professionals on Barriers to VM Application 138
4.4.5 Ranking of Barriers to VM Application in the Construction Industry 143
4.4.6 Ranking of Barrier Components 146

4.5 Success Factors of Value Management Application 147
4.5.1 Normality Test for Success Factors Attributes 149
4.5.2 Test of Instrument Reliability for Success Factors Attributes 150
4.5.3 Factor Analysis of Success Factors for VM Application 151
4.5.4 Construction Professionals Perception on the Success Factors of VM 153
4.5.5 Ranking of Success Factors for VM Application in the Construction Industry 158

4.6 Summary 161
5 DEVELOPING A ROADMAP FOR VALUE MANAGEMENT IMPLEMENTATION IN THE NIGERIAN CONSTRUCTION INDUSTRY 162

5.1 Introduction 162

5.2 Measurement and Structural Models for VM Application 162

5.3 Measurement Models 163
  5.3.1 Path Identification of Current Value-Added Activities 163
  5.3.2 Critical Success Factor Paths in VM Application 164

5.4 Structural Models Using SEM 165
  5.4.1 Structural Model for VM Current Value-Added Activities 166
  5.4.2 Structural Model for Success Factors of VM Application 167

5.5 Effect of Critical Success Factors on Current Practices of VM 168

5.6 Requirements for VM Implementation 172
  5.6.1 People 173
  5.6.2 Government 174
  5.6.3 Environment 174
  5.6.4 Information/Methodology 175

5.7 Roadmap for VM Implementation in the Nigerian Construction Industry 177

5.8 The Purpose and Scope of the VM Roadmap 180

5.9 Validation of the Roadmap 181
  5.9.1 Purpose of the Validation 181
  5.9.2 Response Rate and Background of Participants 182
  5.9.3 Suitability and Acceptance of the Roadmap 184
5.9.4 Validation of VM Implementation Requirements 185

5.9.5 Summary and Impact of Validation Findings 190

5.10 Summary 190

6 CONCLUSION AND RECOMMENDATION 192

6.1 Introduction 192

6.2 Conclusion 192

6.3 The Accomplishment of Research Objectives 194

6.3.1 Determining the Current Value-Added Activities 194

6.3.2 Establishing the Barriers to VM Practice 196

6.3.3 Establishing the CSFs for VM Practice 197

6.3.4 Establishing the effect of CSFs on Current Value-Added Activities 199

6.3.5 Establishing the Requirements for VM Practice 199

6.3.6 Developing Roadmap for VM implementation in the Construction Industry 200

6.4 Contribution to Knowledge 201

6.4.1 Practical Implementation 201

6.4.2 Theoretical Implementation 202

6.5 Limitation of the Research 202

6.6 Recommendation for Further Research 203

REFERENCES 204

Appendices A-E 223-292
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE NO.</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Historical development of value management</td>
<td>18</td>
</tr>
<tr>
<td>2.2</td>
<td>Definitions of value management</td>
<td>22</td>
</tr>
<tr>
<td>2.3</td>
<td>Project needs of public construction clients in Nigeria</td>
<td>25</td>
</tr>
<tr>
<td>2.4</td>
<td>Comparison of UK and US VM workshop practices</td>
<td>41</td>
</tr>
<tr>
<td>2.5</td>
<td>Comparison of UK and US VM workshop practices</td>
<td>44</td>
</tr>
<tr>
<td>2.6</td>
<td>Merits and demerits of external facilitiation</td>
<td>47</td>
</tr>
<tr>
<td>2.7</td>
<td>Merits and demerits of internal facilitiation</td>
<td>48</td>
</tr>
<tr>
<td>2.8</td>
<td>‘Hard’ competencies of VM facilitators</td>
<td>49</td>
</tr>
<tr>
<td>2.9</td>
<td>‘Soft’ competencies of VM facilitators</td>
<td>50</td>
</tr>
<tr>
<td>2.10</td>
<td>Success factors of VM workshop derived from previous studies</td>
<td>54</td>
</tr>
<tr>
<td>2.11</td>
<td>Barriers to VM application derived from previous studies</td>
<td>56</td>
</tr>
<tr>
<td>2.12</td>
<td>Sectoral GDP contributions to Nigeria economy</td>
<td>58</td>
</tr>
<tr>
<td>3.1</td>
<td>List of registered professionals</td>
<td>81</td>
</tr>
<tr>
<td>3.2</td>
<td>Scales used in designing the questionnaire</td>
<td>84</td>
</tr>
<tr>
<td>3.3</td>
<td>Attributes used for questionnaire design</td>
<td>85</td>
</tr>
<tr>
<td>3.4</td>
<td>Goodness-of-fit statistics used in model determination</td>
<td>100</td>
</tr>
<tr>
<td>4.1</td>
<td>Value-added activities in the construction industry</td>
<td>114</td>
</tr>
<tr>
<td>4.2</td>
<td>Test of normality for current value-added attributes</td>
<td>115</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>Cronbach’s Alpha coefficient of current value-added attributes</td>
<td></td>
</tr>
<tr>
<td>4.4</td>
<td>KMO and Bartlett's test for current value-added activities</td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td>Rotated component matrixa for current value-added attributes</td>
<td></td>
</tr>
<tr>
<td>4.6</td>
<td>Reliability for current value-added activities</td>
<td></td>
</tr>
<tr>
<td>4.7</td>
<td>Mean scores of CP of VM among respondents</td>
<td></td>
</tr>
<tr>
<td>4.8</td>
<td>Ranking of current value-added activities among construction professionals</td>
<td></td>
</tr>
<tr>
<td>4.9</td>
<td>Overall ranking of value-added activities in the construction industry</td>
<td></td>
</tr>
<tr>
<td>4.10</td>
<td>Top ten (10) current value-added activities</td>
<td></td>
</tr>
<tr>
<td>4.11</td>
<td>Lowest ten (10) current value-added activities</td>
<td></td>
</tr>
<tr>
<td>4.12</td>
<td>RII of current-value added activities among construction professionals</td>
<td></td>
</tr>
<tr>
<td>4.13</td>
<td>Level of importance of current-value added activities in the Nigerian construction industry</td>
<td></td>
</tr>
<tr>
<td>4.14</td>
<td>Barriers to VM application in the construction industry</td>
<td></td>
</tr>
<tr>
<td>4.15</td>
<td>Test of normality for barrier attributes</td>
<td></td>
</tr>
<tr>
<td>4.16</td>
<td>Cronbach’s Alpha coefficient of barrier attributes</td>
<td></td>
</tr>
<tr>
<td>4.17</td>
<td>KMO and Bartlett's Test for barriers to VM application</td>
<td></td>
</tr>
<tr>
<td>4.18</td>
<td>Rotated component matrixa for barrier attributes</td>
<td></td>
</tr>
<tr>
<td>4.19</td>
<td>Reliability of barriers to VM Application</td>
<td></td>
</tr>
<tr>
<td>4.20</td>
<td>Mean scores of barriers to VM application among construction professionals</td>
<td></td>
</tr>
<tr>
<td>4.21</td>
<td>Ranking of barriers to VM application among construction professionals</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>4.22</td>
<td>Barriers to VM application in the Nigerian construction industry</td>
<td>144</td>
</tr>
<tr>
<td>4.23</td>
<td>Ranking of barrier components</td>
<td>146</td>
</tr>
<tr>
<td>4.24</td>
<td>Success factors for VM application in the construction industry</td>
<td>148</td>
</tr>
<tr>
<td>4.25</td>
<td>Test of normality for success factors attributes</td>
<td>149</td>
</tr>
<tr>
<td>4.26</td>
<td>Cronbach’s Alpha coefficient of success factors attributes</td>
<td>150</td>
</tr>
<tr>
<td>4.27</td>
<td>KMO and Bartlett's test for success factors to VM application</td>
<td>151</td>
</tr>
<tr>
<td>4.28</td>
<td>Rotated component matrix for success factors of VM</td>
<td>152</td>
</tr>
<tr>
<td>4.29</td>
<td>Reliability of success factors for VM application</td>
<td>153</td>
</tr>
<tr>
<td>4.30</td>
<td>Mean scores of success factors of VM application among construction professionals</td>
<td>155</td>
</tr>
<tr>
<td>4.31</td>
<td>Critical success factors of VM application among construction professionals</td>
<td>156</td>
</tr>
<tr>
<td>4.32</td>
<td>Ranking of success factors for VM application in the Nigerian construction industry</td>
<td>159</td>
</tr>
<tr>
<td>5.1</td>
<td>Fit indices of models for current value-added activities</td>
<td>171</td>
</tr>
<tr>
<td>5.2</td>
<td>Fit indices of models for the CSFs of VM</td>
<td>171</td>
</tr>
<tr>
<td>5.3</td>
<td>Fit indices of models for the CSFs effect on current value-added activities</td>
<td>171</td>
</tr>
<tr>
<td>5.4</td>
<td>Ranking of CSFs Components</td>
<td>172</td>
</tr>
<tr>
<td>5.5</td>
<td>Mean values for VM implementation requirements</td>
<td>187</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE NO.</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Map of Nigeria showing Abuja, Kaduna and Jos.</td>
<td>13</td>
</tr>
<tr>
<td>1.2</td>
<td>Structure of thesis</td>
<td>14</td>
</tr>
<tr>
<td>2.1</td>
<td>Components of value management</td>
<td>24</td>
</tr>
<tr>
<td>2.2</td>
<td>A typical FAST diagram</td>
<td>27</td>
</tr>
<tr>
<td>2.3</td>
<td>A generic model of the VM process</td>
<td>37</td>
</tr>
<tr>
<td>2.4</td>
<td>Value study process flow diagram</td>
<td>43</td>
</tr>
<tr>
<td>2.5</td>
<td>The generic VM process</td>
<td>45</td>
</tr>
<tr>
<td>2.6</td>
<td>Organisational structure of VM implementation in Malaysia</td>
<td>52</td>
</tr>
<tr>
<td>2.7</td>
<td>Nigeria’s per capital Gross National Product</td>
<td>58</td>
</tr>
<tr>
<td>2.8</td>
<td>Conceptual framework of the research</td>
<td>69</td>
</tr>
<tr>
<td>3.1</td>
<td>Nested research model</td>
<td>72</td>
</tr>
<tr>
<td>3.2</td>
<td>Research procedure</td>
<td>76</td>
</tr>
<tr>
<td>3.3</td>
<td>Research design for the study</td>
<td>78</td>
</tr>
<tr>
<td>3.4</td>
<td>Research sampling technique for this study</td>
<td>80</td>
</tr>
<tr>
<td>3.5</td>
<td>Steps in structural equation modelling</td>
<td>101</td>
</tr>
<tr>
<td>3.6</td>
<td>Diagram showing esurveysPro.com online software</td>
<td>102</td>
</tr>
<tr>
<td>3.7</td>
<td>Methods adopted in relation to the research objectives</td>
<td>105</td>
</tr>
<tr>
<td>5.9</td>
<td>Participants’ response rate from esurveyspro.com</td>
<td>182</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>5.10</td>
<td>Academic qualification of construction experts</td>
<td>183</td>
</tr>
<tr>
<td>5.11</td>
<td>Specialisation of construction experts</td>
<td>183</td>
</tr>
<tr>
<td>5.12</td>
<td>Years of experts’ experience in the construction industry</td>
<td>184</td>
</tr>
<tr>
<td>5.13</td>
<td>Validated VM implementation requirements</td>
<td>188</td>
</tr>
</tbody>
</table>
## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM</td>
<td>Value Management</td>
</tr>
<tr>
<td>FA</td>
<td>Function Analysis</td>
</tr>
<tr>
<td>LCC</td>
<td>Life Cycle Cost</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>KM</td>
<td>Knowledge Management</td>
</tr>
<tr>
<td>CSF</td>
<td>Critical Success Factor</td>
</tr>
<tr>
<td>SEM</td>
<td>Structural Equation Modelling</td>
</tr>
<tr>
<td>EFA</td>
<td>Exploratory Factor Analysis</td>
</tr>
<tr>
<td>CFA</td>
<td>Confirmatory Factor Analysis</td>
</tr>
<tr>
<td>RM</td>
<td>Risk Management</td>
</tr>
<tr>
<td>VMW</td>
<td>Value Management Workshop</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
</tr>
<tr>
<td>AMOS</td>
<td>Analysis of Moment Structures</td>
</tr>
<tr>
<td>NIA</td>
<td>Nigerian Institute of Architects</td>
</tr>
<tr>
<td>NIQS</td>
<td>Nigerian Institute of Quantity Surveyors</td>
</tr>
<tr>
<td>NIOB</td>
<td>Nigerian Institute of Building</td>
</tr>
<tr>
<td>NSE</td>
<td>Nigerian Society of Engineers</td>
</tr>
<tr>
<td>SF</td>
<td>Success Factor</td>
</tr>
<tr>
<td>SAVE</td>
<td>Society of American Value Engineers</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>FGN</td>
<td>Federal Government of Nigeria</td>
</tr>
<tr>
<td>MS</td>
<td>Mean Score Index</td>
</tr>
<tr>
<td>RII</td>
<td>Relative Importance Index</td>
</tr>
<tr>
<td>FAST</td>
<td>Function Analysis System Technique</td>
</tr>
<tr>
<td>QS</td>
<td>Quantity Surveyor</td>
</tr>
<tr>
<td>QSRBN</td>
<td>Quantity Surveyors Registration Board of Nigeria</td>
</tr>
<tr>
<td>FAST</td>
<td>Function Analysis System Technique</td>
</tr>
<tr>
<td>BOT</td>
<td>Build Operate Transfer</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnership</td>
</tr>
<tr>
<td>CFI</td>
<td>Comparative Fit Index</td>
</tr>
<tr>
<td>GFI</td>
<td>Goodness-of-Fit Index</td>
</tr>
<tr>
<td>RMSEA</td>
<td>Root Mean Square Error of Approximation</td>
</tr>
</tbody>
</table>
## LIST OF APPENDICES

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>List of Publications</td>
<td>223</td>
</tr>
<tr>
<td>B</td>
<td>Research Questionnaire</td>
<td>225</td>
</tr>
<tr>
<td>C</td>
<td>Respondents’ Outliers and Total Variance of Attribute</td>
<td>232</td>
</tr>
<tr>
<td>D</td>
<td>Cross-tabulation Analysis of Research Attributes</td>
<td>235</td>
</tr>
<tr>
<td>E</td>
<td>Online Validation Results</td>
<td>288</td>
</tr>
</tbody>
</table>
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, Iben 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.
1. Introduction
Provides the background of the research; the problem statement; research questions; aim and objectives; justification of the study; brief methodology; research terminologies; and defined the scope of the research.

2. Literature Review
Discusses VM theory and concept; history, definitions, reasons, and approaches to VM; the construction industry and VM; VM workshop and job plan; VM duration, applicability, and facilitation; the Nigerian construction industry (NCI); constraints to project delivery in the NCI; value-added activities in the NCI; and conceptual framework of the research.

3. Research Methodology
Outlines the research procedure; quantitative nature of the research; research design (time horizon, sampling technique, research population, questionnaire, pilot survey, data collection); and the method of data analysis.

4. Current Value-Added Activities, Barriers and Critical Success Factors for VM Application in the NCI
This chapter presents and discusses the demographic analysis of research respondents, and discusses how objectives 1, 2 and 3 are achieved.

5. Developing a Roadmap for VM Implementation in the Nigerian Construction Industry
This chapter presents the development of a roadmap for VM implementation by establishing the relationship between CSFs and the current value-added activities in the NCI. The validation of the roadmap was also presented in this chapter.

6. Conclusion and Recommendation
This chapter concludes the thesis, highlights the accomplishment of research objectives; contribution to knowledge; limitation of the research; and recommendation for further research.

Figure 1.2  Structure of thesis
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Engineering and the Built Environment, Edinburgh Napier University, Edinburgh.


