CHANGE MANAGEMENT CAPABILITY ASSESSMENT MODEL FOR CONSTRUCTION ORGANIZATIONS

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Specially dedicated to the memory of my lovely late father Mr. Arowosegbe Rufus, my loving late wife Mrs. Hellen Iyabode Arowosegbe, my mother Mrs. Arowosegbe Florence, my lovely wife and my God-given children.
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ABSTRACT

The complexity of construction led to the fragmentation of design and construction process with different professionals independently handling each process. This characteristic triggers project changes. The inconsistent management of project changes, especially its implementation causes major risks of cost and time overruns, quality defects, conflicts, and safety issues. However, these challenges raise concerns about how diligently capable the construction organizations are in their work. Lack of management capability affects the performance of construction organizations in terms of project delivery within the constraint of cost and time. However, not much has been reported in the literature on management capability maturity of construction organizations, its assessment and impacts on cost and time performance of building projects in Nigeria. Supporting this claim is the agitations in construction cycle for a unique methodological approach that enables capability maturity assessment to improve performance in building projects. Against this background, this research therefore investigates the impact of change management capability maturity level of construction organizations (CMCML), assessment of impact of CMCML on cost and time performance and development of a CMCML assessment model for construction organizations. Quantitative research approach that uses questionnaire survey mechanism was adopted for data collection. A total of 42 questionnaires were hand distributed to project managers, project quantity surveyors and contract managers, across construction organizations in southwest zone of Nigeria. The administered questionnaires retrieved revealed 95% response rate. Collected data were analysed using the following quantitative tools; frequency, Spearman’s rank correlation, factor analysis, multiple regression and fuzzy synthetic evaluation techniques. The empirical research findings reveal that the overall CMCML of construction organizations is ‘moderate’ at 3.35 maturity rating and not far from maturity with a value of 1 indicating very low and 5 indicating very high. Findings further indicate poor management capability of contractors as the most prevalent contractor-related factors impacting project changes. The research findings also show that change management capability of construction organization has significant impact on cost and time performance of building projects. Finally, the research provide a CMCML assessment model capable of determining the capability maturity level of construction organizations as well as showing the cost and time performance of construction organizations in building projects.
ABSTRAK

# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>ii</td>
<td></td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
<td></td>
</tr>
<tr>
<td>ACKNOWLEDGMENT</td>
<td>iv</td>
<td></td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>ABSTRAK</td>
<td>vi</td>
<td></td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>vii</td>
<td></td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xiv</td>
<td></td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xvi</td>
<td></td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS</td>
<td>xviii</td>
<td></td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>xix</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1</td>
<td>Background of the Study</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>Statement of Problem</td>
<td>6</td>
</tr>
<tr>
<td>1.3</td>
<td>Research Questions</td>
<td>10</td>
</tr>
<tr>
<td>1.4</td>
<td>Research Objectives</td>
<td>11</td>
</tr>
<tr>
<td>1.5</td>
<td>Scope and Limitation of the Study</td>
<td>12</td>
</tr>
<tr>
<td>1.6</td>
<td>Justification for the Study</td>
<td>13</td>
</tr>
<tr>
<td>1.7</td>
<td>Contribution to Knowledge</td>
<td>14</td>
</tr>
<tr>
<td>1.8</td>
<td>Research Methodology</td>
<td>15</td>
</tr>
<tr>
<td>1.9</td>
<td>Research Structure and Content</td>
<td>17</td>
</tr>
</tbody>
</table>
### 2 CHANGE MANAGEMENT IN CONSTRUCTION

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Introduction</td>
<td>20</td>
</tr>
<tr>
<td>2.2</td>
<td>Construction Industry in Nigeria</td>
<td>20</td>
</tr>
<tr>
<td>2.3</td>
<td>Project Change in Construction</td>
<td>27</td>
</tr>
<tr>
<td>2.3.1</td>
<td>Causes of changes in construction Project</td>
<td>30</td>
</tr>
<tr>
<td>2.3.2</td>
<td>Effects of Changes in Construction Project</td>
<td>34</td>
</tr>
<tr>
<td>2.4</td>
<td>Change Orders in Construction Projects</td>
<td>37</td>
</tr>
<tr>
<td>2.4.1</td>
<td>Causes of Change Orders</td>
<td>40</td>
</tr>
<tr>
<td>2.4.2</td>
<td>Impact of Change Orders</td>
<td>42</td>
</tr>
<tr>
<td>2.5</td>
<td>Change Management Processes</td>
<td>45</td>
</tr>
<tr>
<td>2.5.1</td>
<td>Identify Change</td>
<td>47</td>
</tr>
<tr>
<td>2.5.2</td>
<td>Evaluate Change</td>
<td>47</td>
</tr>
<tr>
<td>2.5.3</td>
<td>Approve Change</td>
<td>47</td>
</tr>
<tr>
<td>2.5.4</td>
<td>Implement Change</td>
<td>48</td>
</tr>
<tr>
<td>2.5.5</td>
<td>Improve from Lessons Learned</td>
<td>48</td>
</tr>
<tr>
<td>2.6</td>
<td>Change Management Models in Construction</td>
<td>50</td>
</tr>
<tr>
<td>2.6.1</td>
<td>Systematic Change Management Process Model</td>
<td>50</td>
</tr>
<tr>
<td>2.6.2</td>
<td>Generic Change Management Process Model</td>
<td>53</td>
</tr>
<tr>
<td>2.6.3</td>
<td>Knowledge-Base Decision Support System (KBDSS) Model for Change Management</td>
<td>55</td>
</tr>
<tr>
<td>2.7</td>
<td>Critical Success Factors in Change Management</td>
<td>58</td>
</tr>
<tr>
<td>2.7.1</td>
<td>Communication</td>
<td>58</td>
</tr>
<tr>
<td>2.7.2</td>
<td>Motivation</td>
<td>59</td>
</tr>
<tr>
<td>2.7.3</td>
<td>Commitment</td>
<td>60</td>
</tr>
<tr>
<td>2.7.4</td>
<td>Training</td>
<td>60</td>
</tr>
<tr>
<td>2.7.5</td>
<td>Leadership</td>
<td>61</td>
</tr>
<tr>
<td>2.7.6</td>
<td>Participation</td>
<td>61</td>
</tr>
<tr>
<td>2.8</td>
<td>People Issues in Change Management</td>
<td>62</td>
</tr>
<tr>
<td>2.8.1</td>
<td>Individual Reaction to Change</td>
<td>63</td>
</tr>
<tr>
<td>2.8.2</td>
<td>Organizational Culture</td>
<td>65</td>
</tr>
<tr>
<td>2.9</td>
<td>Change Management Capability Maturity</td>
<td>65</td>
</tr>
<tr>
<td>2.9.1</td>
<td>Management Capability</td>
<td>65</td>
</tr>
<tr>
<td>2.9.2</td>
<td>Definition and Concept of Maturity</td>
<td>67</td>
</tr>
<tr>
<td>2.9.3</td>
<td>Capability Maturity Models</td>
<td>69</td>
</tr>
</tbody>
</table>
2.10 Method and Operationalization for the Construction of the Proposed Change Management Maturity Model (CMCMM)
  2.10.1 Development Principles
  2.10.2 Key Capability Areas of Change Management Capability Maturity Model
    2.10.2.1 Quantitative Indicators Adopted for Assessment of Capability Areas
    2.10.3 Definition of Change Management Capability Maturity Levels
  2.11 Summary of the Chapter

3 RESEARCH METHODOLOGY
  3.1 Introduction
  3.2 Research Methodology
  3.3 Research Methodology Framework
  3.4 Research Approach
    3.4.1 Overview of Research Approaches
      3.4.1.1 Quantitative Approach
      3.4.1.2 Qualitative Approach
      3.4.1.3 Mixed Method Approach
  3.5 Consensus-Forming Techniques
    3.5.1 Delphi Technique
  3.6 Research Design Adopted
    3.6.1 Survey Design
      3.6.1.1 Types of Survey
    3.6.2 Population of the Study
    3.6.3 Sampling Techniques and Sample Size
    3.6.4 Research Instrument and Measurement
      3.6.4.1 Questionnaire Design
  3.7 Analytical Techniques
  3.8 Review of Research Tools Adopted
    3.8.1 Correlation
    3.8.2 Fuzzy Logic System
    3.8.3 Fuzzy Synthetic Evaluation Literature
    3.8.4 Linguistic Variable and Membership Function
3.9 Summary of the Chapter.

4 DATA ANALYSIS AND DISCUSSIONS

4.1 Introduction

4.2 Characteristic of Respondents

4.3 Assessment of Change Management Capability Level of Contracting Organizations

   4.3.1 Identification of Change Management Attributes (CMCA) and Quantitative Indicators (CMCQIs)
   4.3.2 Frequency, Severity, Importance and Normalization Methods
   4.3.3 Fuzzy Synthetic Evaluation
   4.3.4 Development of Appropriate Weighting for Change Management Capability Attributes and Quantitative Indicators
   4.3.5 Computation of Membership Functions for change Management Capability Attributes and Quantitative Indicators
   4.3.6 Development of Fuzzy Synthetic Evaluation Model for CMC of Contracting Organizations for Building Projects in Nigeria
   4.3.7 Findings and Discussions
   4.3.8 Summary of Findings

4.4 Identification of Significant Contractor-Related Factors Contributing to Change Orders

   4.4.1 Determination of Frequency of Factors
   4.4.2 Determination of Severity of Factors
   4.4.3 Determination of degree Importance of Factors
   4.4.4 Ranking of Contractor-Related Factors
   4.4.5 Findings and Discussions
   4.4.6 Determination of Level of Agreement among Principal Participants of Project.
   4.4.7 Extraction of Significant Factors Using Factor Analysis
   4.4.8 Findings and Discussions
   4.4.9 Summary of Findings
4.5 Assessment of Impact of Change Management Capability of Contracting Organizations on Cost and Time Performance of Building Projects. 183
4.5.1 Determination of Correlational Association Between Variables Using Multiple Linear Regression 191
4.5.2 Selection of Regression Model 195
4.5.3 Results and Discussions 196
4.5.4 Validation of the Developed Model 198
4.5.5 Findings and discussions 201
4.5.6 Summary of the Chapter 202

5 MODEL DEVELOPMENT, VALIDATION AND EVALUATION 204
5.1 Introduction 204
5.2 Development Process 204
5.3 Systematic Process of the Basic Principles of the Model 208
5.4 Validation of the Model 216
  5.4.1 Delphi Validation process 216
5.5 Data Analysis and Discussions 220
  5.5.1 Demographic Characteristics of Respondents 220
  5.5.2 Assessment of the Model 221
    5.5.2.1 Tabulation and Ranking of the First Round of Delphi Survey Process 221
    5.5.2.2 Tabulation and Ranking of Round Two Delphi Survey Process 224
  5.5.3 Summary of the Chapter 229

6 CONCLUSION AND RECOMMENDATIONS 231
6.1 Introduction 231
6.2 Conclusion 232
6.3 Recommendation 236
6.4 Suggested Areas for Further Research 237
6.5 Concluding Remark 238

REFERENCES 239
Appendices A – H 265 - 287
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLES NO.</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Causes of project changes</td>
<td>3</td>
</tr>
<tr>
<td>1.2</td>
<td>Effects of project changes</td>
<td>3</td>
</tr>
<tr>
<td>1.3</td>
<td>Gap analysis between previous studies and this research</td>
<td>10</td>
</tr>
<tr>
<td>2.1</td>
<td>Construction industry growth rate and percentage contribution to national GDP.</td>
<td>23</td>
</tr>
<tr>
<td>2.2</td>
<td>Sources of resistance to change.</td>
<td>64</td>
</tr>
<tr>
<td>2.3</td>
<td>Maturity models developed for the construction industry</td>
<td>71</td>
</tr>
<tr>
<td>3.1</td>
<td>Advantages and disadvantages of survey research design</td>
<td>104</td>
</tr>
<tr>
<td>3.2</td>
<td>Comparison of advantages of two methods of structured survey</td>
<td>107</td>
</tr>
<tr>
<td>3.3</td>
<td>Categories of respondents</td>
<td>111</td>
</tr>
<tr>
<td>3.4</td>
<td>Analysis of the study areas</td>
<td>111</td>
</tr>
<tr>
<td>3.5</td>
<td>Set ‘A’ of questionnaire design</td>
<td>116</td>
</tr>
<tr>
<td>3.6</td>
<td>Set ‘B’ of questionnaire design</td>
<td>116</td>
</tr>
<tr>
<td>3.7</td>
<td>Analytical techniques adopted in the research</td>
<td>119</td>
</tr>
<tr>
<td>3.8</td>
<td>Research tools adopted for the study</td>
<td>121</td>
</tr>
<tr>
<td>4.1</td>
<td>Demographic characteristics of respondents</td>
<td>134</td>
</tr>
<tr>
<td>4.2</td>
<td>Set ‘A’ of questionnaire design</td>
<td>135</td>
</tr>
<tr>
<td>4.3</td>
<td>Designation and working experience of respondents</td>
<td>136</td>
</tr>
<tr>
<td>4.4</td>
<td>The mean rating and weightings of CMC indicators for contracting organizations</td>
<td>144</td>
</tr>
<tr>
<td>4.5</td>
<td>The membership functions of all states of CMC attributes</td>
<td>146</td>
</tr>
<tr>
<td>4.6</td>
<td>The membership functions of overall CMC level of contracting organizations</td>
<td>149</td>
</tr>
<tr>
<td>4.7</td>
<td>Result of CMC level of each capability area and overall capability level of contracting organization</td>
<td>149</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>4.8</td>
<td>Interpretation of maturity level</td>
<td>151</td>
</tr>
<tr>
<td>4.9</td>
<td>Reliability statistics</td>
<td>152</td>
</tr>
<tr>
<td>4.10</td>
<td>Statistic of questionnaire administered</td>
<td>156</td>
</tr>
<tr>
<td>4.11</td>
<td>Frequency of Factors that Influences Change Orders</td>
<td>158</td>
</tr>
<tr>
<td>4.12</td>
<td>Severity of Factors that Influences Change Orders</td>
<td>159</td>
</tr>
<tr>
<td>4.13</td>
<td>Importance of Factors that Influences Change Orders</td>
<td>160</td>
</tr>
<tr>
<td>4.14</td>
<td>Spearman’s rank correlation</td>
<td>167</td>
</tr>
<tr>
<td>4.15</td>
<td>KMO and Bartlett’s test</td>
<td>168</td>
</tr>
<tr>
<td>4.16</td>
<td>Reliability statistics</td>
<td>169</td>
</tr>
<tr>
<td>4.17</td>
<td>Total variance explained</td>
<td>169</td>
</tr>
<tr>
<td>4.18</td>
<td>Rotated component matrix</td>
<td>171</td>
</tr>
<tr>
<td>4.19</td>
<td>JA construction company</td>
<td>184</td>
</tr>
<tr>
<td>4.20</td>
<td>The membership functions of overall CMC level for JA contracting organization</td>
<td>184</td>
</tr>
<tr>
<td>4.21</td>
<td>Result of CMC level for each capability area and overall capability level of JA contracting organization</td>
<td>185</td>
</tr>
<tr>
<td>4.22</td>
<td>Result of CMC level and data for percentage of cost-time overruns</td>
<td>186</td>
</tr>
<tr>
<td>4.23</td>
<td>Statistics of questionnaire administered</td>
<td>187</td>
</tr>
<tr>
<td>4.24</td>
<td>Spearman’s rank correlations</td>
<td>188</td>
</tr>
<tr>
<td>4.25</td>
<td>Pearson correlation</td>
<td>194</td>
</tr>
<tr>
<td>4.26</td>
<td>Coefficients</td>
<td>195</td>
</tr>
<tr>
<td>4.27</td>
<td>Regression model summary</td>
<td>198</td>
</tr>
<tr>
<td>4.28</td>
<td>ANOVA</td>
<td>198</td>
</tr>
<tr>
<td>4.29</td>
<td>Regression result for the predicted time model summary</td>
<td>199</td>
</tr>
<tr>
<td>4.30</td>
<td>Regression result for the observed time model summary</td>
<td>199</td>
</tr>
<tr>
<td>4.31</td>
<td>Regression result for the predicted cost model summary</td>
<td>199</td>
</tr>
<tr>
<td>4.32</td>
<td>Regression result for the observed cost model summary</td>
<td>200</td>
</tr>
<tr>
<td>5.1</td>
<td>Background information of respondents</td>
<td>221</td>
</tr>
<tr>
<td>5.2</td>
<td>Appropriateness of attributes adopted for round one</td>
<td>222</td>
</tr>
<tr>
<td>5.3</td>
<td>Overall assessment of the model for round one</td>
<td>223</td>
</tr>
<tr>
<td>5.4</td>
<td>Appropriateness of attributes adopted for round two</td>
<td>224</td>
</tr>
<tr>
<td>5.5</td>
<td>Overall assessment of the model for round two</td>
<td>225</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>The study areas for the research</td>
<td>13</td>
</tr>
<tr>
<td>1.2</td>
<td>Research methodology flowcharts</td>
<td>16</td>
</tr>
<tr>
<td>1.3</td>
<td>Research structure and content flowcharts</td>
<td>19</td>
</tr>
<tr>
<td>2.1</td>
<td>Map of Africa showing location of Nigeria</td>
<td>21</td>
</tr>
<tr>
<td>2.2</td>
<td>Administrative map of Nigeria and six geo-political zones</td>
<td>22</td>
</tr>
<tr>
<td>2.3</td>
<td>Project management structure in Nigeria</td>
<td>26</td>
</tr>
<tr>
<td>2.4</td>
<td>A relationship diagram for a change case</td>
<td>36</td>
</tr>
<tr>
<td>2.5</td>
<td>Change orders factors and impacts</td>
<td>44</td>
</tr>
<tr>
<td>2.6</td>
<td>Change management process</td>
<td>46</td>
</tr>
<tr>
<td>2.7</td>
<td>Change management system</td>
<td>51</td>
</tr>
<tr>
<td>2.8</td>
<td>Fundamental principles of change management</td>
<td>56</td>
</tr>
<tr>
<td>2.9</td>
<td>Information richness of communication channel</td>
<td>59</td>
</tr>
<tr>
<td>2.10</td>
<td>Dealing with people issues during change project</td>
<td>63</td>
</tr>
<tr>
<td>2.11</td>
<td>Typical five level maturity model</td>
<td>70</td>
</tr>
<tr>
<td>2.12</td>
<td>Diagram showing principal attributes and quantitative indicators</td>
<td>78</td>
</tr>
<tr>
<td>2.13</td>
<td>Overview of change management capability maturity model (CMCMM)</td>
<td>83</td>
</tr>
<tr>
<td>3.1</td>
<td>Research methodology flowchart adopted in this study</td>
<td>92</td>
</tr>
<tr>
<td>3.2</td>
<td>Framework for research design</td>
<td>93</td>
</tr>
<tr>
<td>3.3</td>
<td>Nested approach of research methodology</td>
<td>94</td>
</tr>
<tr>
<td>3.4</td>
<td>Breadth versus depth in question-based studies</td>
<td>105</td>
</tr>
<tr>
<td>3.5</td>
<td>Architecture of fuzzy logic based CMCML decision support tool</td>
<td>124</td>
</tr>
<tr>
<td>3.6</td>
<td>Detail architecture of fuzzy logic system which accepts imprecise data and provide decisions of CMCL</td>
<td>125</td>
</tr>
<tr>
<td>3.7</td>
<td>Analytical procedure for the fuzzy synthetic evaluation model</td>
<td>128</td>
</tr>
</tbody>
</table>
3.8 Boundary region of fuzzy set 130
3.9 Linguistic variable and fuzzy membership mapping 131
4.1 Normalization value of quantitative indicators of leadership 138
4.2 Normalization value of quantitative indicators of application 138
4.3 Normalization value of quantitative indicators of competencies 139
4.4 Normalization value of quantitative indicators of standardization 139
4.5 Normalization value of quantitative indicators of socialization 140
4.6 Overall change management capability maturity model score graph. 149
4.7 Capability area scores graph showing what aspects are working and what aspects need more attention 150
4.8 Taxonomy of factors influencing change orders 161
4.9 Scree plot diagram 170
4.10 Maturity levels of principal attributes of JA construction company 185
4.11 Overall CMC maturity levels of JA construction company 186
4.12 Pattern of relationship between CMC level (dependent variable) and cost overrun (independent variables) 190
4.13 Pattern of relationship between CMC level (dependent variable) and time overrun (independent variables) 190
4.14 Normal P-P plot of regression standardized residual 193
4.15 Scattered plot graph 193
4.16 Regression result for the predicted cost and time overruns 200
4.17 Regression result for the observed cost and time overruns 201
5.1 Model for the systematic assessment and improvement of construction organizations’ change management capability maturity. 215
5.2 Delphi survey process flowchart 217
5.3 Overall model assessment 225
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIA</td>
<td>American Institute of Architects</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>CMC</td>
<td>Change Management Capability</td>
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<tr>
<td>CMCML</td>
<td>Change Management Capability Maturity Level</td>
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<tr>
<td>CMCMM</td>
<td>Change Management Capability Maturity Model</td>
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<td>CMMI</td>
<td>Capability Maturity Model Integration</td>
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<td>CMCQI</td>
<td>Change Management Capability Quantitative Indicator</td>
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<tr>
<td>CII</td>
<td>Construction Industry Institute</td>
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<tr>
<td>CMM</td>
<td>Capability Maturity Model</td>
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<td>ETF</td>
<td>Education Tax Fund</td>
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<td>ISO</td>
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<td>JCT</td>
<td>Joint Contract Tribunal</td>
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<td>LOC</td>
<td>Library of Congress</td>
</tr>
<tr>
<td>NECA</td>
<td>National Electrical Contractors Association</td>
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<td>OCMCL</td>
<td>Overall Change Management Capability Level</td>
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<tr>
<td>OPM3</td>
<td>Organizational Project Management 3</td>
</tr>
<tr>
<td>PMBOK</td>
<td>Project Management Book of Knowledge</td>
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<td>PMI</td>
<td>Project Management Institute</td>
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<tr>
<td>PAG</td>
<td>Principal Attribute Group</td>
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<tr>
<td>QI</td>
<td>Quantitative Indicator</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Science</td>
</tr>
<tr>
<td>USA</td>
<td>United State of America</td>
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<tr>
<td>UK</td>
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<tr>
<td>WBS</td>
<td>Work Breakdown Structure.</td>
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## LIST OF APPENDICES

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Letter of Introduction from UTM (titled ‘to whom it may concern)</td>
<td>265</td>
</tr>
<tr>
<td>B</td>
<td>Letter of Introduction to the Industry Participants in Nigeria</td>
<td>266</td>
</tr>
<tr>
<td>C</td>
<td>Questionnaire for Impact of Change Management Capability of Contracting Organizations on Cost and Time Performance of Building Projects</td>
<td>267</td>
</tr>
<tr>
<td>D</td>
<td>Result of Normalization Value of Quantitative Indicators of CMC.</td>
<td>275</td>
</tr>
<tr>
<td>E</td>
<td>Letter of Introduction to Delphi Survey Experts</td>
<td>279</td>
</tr>
<tr>
<td>F</td>
<td>Delphi survey Questionnaire for Framework Validation Round One</td>
<td>280</td>
</tr>
<tr>
<td>G</td>
<td>Delphi survey Questionnaire for Framework Validation Round Two</td>
<td>284</td>
</tr>
<tr>
<td>H</td>
<td>List of Publications</td>
<td>287</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

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Wallace (2007) examined that several reasons are responsible for change occurrence, and these reasons are to be known as change causes, or drivers. Generally different opinions have been stated by different researchers on the drivers of project change. However, two major classifications of external and internal were expressed by some of the authors. The sub-division given by these authors are responsible for differences in their view points. Table 1.1 and 1.2 represents the taxonomy of causes and impacts of changes in construction projects.
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Project change management is an integral part of project management; hence it relates all the internal and external factors that influence project changes. The central idea of project change management process is to envisage possible changes, recognise changes that have occurred, evaluate it, approve the change, document and
improve from lessons learned to sustain the overall viability of the project (Ibbs et al. 2001, Hao et al. 2008, Motawa et al., 2007). Learning from past mistakes is very significant because it affords members of the project team to enrich their experience and appropriately applying it in future projects (Motawa, 2007). Project change and change orders must be resolved through a formalised change management process in order to avoid delays and disruptions in the work program. By adopting systematic and sustained process of handling change orders, there is a high probability of optimising project success. Inconsistent management of the change process results in many disruptive effects. However, the need for mitigating project change negative effects and improving construction processes brought extensive research in the area of mapping and modelling of project change management process.

Ibbs et al. (2001) developed a change management system that was based on five principles: promote a balanced change culture, recognise change, evaluate change, implement change, and continuously improve from lessons learned. Based on similar concept, Sun et al. (2004), developed a toolkits that supports project team’s anticipation of changes and the evaluation of the impacts of these changes. Following the same perspective, the Construction Industry Institute decided to look for a way of minimising or reducing construction delays, increase costs, claims, and expensive litigations that usually accompany project change and established research team. Consequently the CII Research Team (1994) came up with the conclusion that significant savings in overall costs and schedule duration of construction projects are achievable by improving the management of project changes.

As construction organisations are one of the key players in construction industry and the makers of the final product, any development and improvement initiatives in the industry has to consider ways of assessing and improving the change management capability maturity of the organizations. Previous studies by Long et al. (2004) indicated poor managerial capability of contractors as a critical problem in construction industry. Aje et al. (2009) showed management capability as prime criteria for evaluating construction contractors in the period of pre-qualification and tender evaluation for projects. In the same vein, Nigeria Bureau of Public Procurement in 2005 allocated 25%, the highest ever, for management
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However, capability and managerial strength of contractors is not commensurate with the extent of their involvement in construction projects. This fact becomes clear with respect to the extent of occurrence of cost and time overruns in construction projects which is attributable to project change and management incompetency of construction contractors. Capability is concerned with a specific competency which has to be present in an organisation so that such organization can effectively execute project management process. According to OPM3 (Organizational Project Management 3), capability involves incremental steps that usually lead to achieving one or more best practices. However, in OPM3 view, specific capability is adopted as a criterion for assessing organisational maturity. It exists when all the outcomes under the capability have been observed. Therefore, as most of contractors’ works are managed as project, assessing and improving construction organisations’ change management capability maturity will significantly contribute to the overall improvement of construction organizations’ capability maturity to deliver successful projects.

The outcome of this research is capable of ensuring that, client and industry practitioners effectively pre-qualify construction organizations with adequate track record of performance in terms of cost and time. Hence, easy elimination of incompetent construction organizations is achievable and fairer competition among bidders is guaranteed. In addition, construction organizations can easily assess themselves individually in their various organizations before going for any outside bidding competition. The research outcome further provide major attributes for assessing construction organizations competency in managing project changes in construction. Consequently, the developed model in this research will create
opportunity for improvement in construction organization’s performance in terms of completing projects to time schedule and cost budget.

In conclusion, the developed model is capable of strengthened clients’ decision in given thorough consideration to the management capability maturity level as a major criterion for selecting contracting organizations for construction projects.

1.2 Problem Statement

Project change and change orders are generally common and inevitable in all stages of design and construction. They constitute major risk factors for construction projects (Sun et al., 2009). However, common consequences of project changes include cost overrun, schedule delays Aurun, (2007); Naif et al. (2011), quality defects, conflicts and safety issues (Love et al., 2001).

Many projects failure are associated with the critical problem of project change and change orders in the industry today especially when change implementation is inconsistently managed. Motawa et al. (2007) argued that inconsistent management of project change can result in many disruptive effects of cost and time overruns. It is highly significant to identify and analyse potential project changes as early as possible to enhance the performance of project team. Early identification and analysis of project change is capable of facilitating both the assessment and implementation of projects (Ibbs et al., 2001). However, changes in construction do occur, hence a robust change management process is a prerequisite for efficient project management. The negative effects of project change will be minimised if effective change management process are put in place for the management of project changes (Ibbs et al., 2001; Motawa et al., 2007).

Moreover, project change can originate from the client, user, design consultant, project manager and contractor, hence effective management process of
this change are based on the fundamental theory of identify change, evaluate change, approve change, implement change and continuously improve from lessons learned (Ibbs et al., 2001; Hao et al., 2008). Project management team should anticipate and identify potential changes and be ready to provide necessary proactive reactions to mitigate the effect of change. Knowledge learnt from the implementation of the change process is kept for all parties to learn from it. When knowledge about previous cases is expressed by professional team it reduces the disruptive effects of change (Motawa et al., 2003).

Consequently, construction projects frequent changes coupled with inconsistent management prompted previous researchers into developing process-focused approaches (specific models and IT support systems) for managing project changes (Sun et al., 2009). Ibbs et al. (2001) developed a systematic approach founded on five basic principles for managing project change. A project toolkit that supports project team in envisaging potential changes and evaluating their impacts was mapped out by (Sun et al., 2004). Other change management tools developed for use in the management of project changes includes a fuzzy logic based change prediction model with the system dynamic model of the dynamic planning and control methodology (DPM) Motawa et al. (2007), development of a dynamics model of dynamic control methodology (DPM) for the management of unexpected events Park and Pena-Mora (2003), a change prediction framework for managing change scenarios Lee et al. (2005), and a generic procedure for issuing a change orders request (Cox et al., 1999).

Certainly, many of these models enhance change management process in construction projects. Indeed, they have potentials for further development. Nevertheless, the agitations in construction cycle for a unique methodological approach and models that enables capability maturity assessment Sarhsar (2000); Sun et al. (2009) to improve performance in building projects necessitate this study that explored change management capability maturity assessment model for construction organizations. There are many studies in literature focusing on identification of project changes, causes and effects of changes in construction, and change management process in recent years, aiming at increasing the benefits and
supporting change management, very little or no effort of these are focused to research in the area of assessment and improvement of change management capability maturity level of construction organizations to effectively manage project changes in order to enhance good performance of construction projects. Similarly, there has not been much research reported in literature on the impact of change management capability maturity level of construction organisation on cost and time performance of building projects. Project change and change orders has been established to have it direct negative impacts on such issues associated with cost overrun and schedule delays, disputes and rework (Sun et al., 2009). However, several of the generic models developed can facilitate change management process but cannot be adopted as a basis for systematic assessment and improvement (Sun et al., 2009).

Against this background, these gaps in the literature are addressed in this research project. The study focuses on developing more efficient and effective methodology of assessment and improvement of the change management capability maturity level of construction organizations in the management of project changes. In addition, the study further focuses on evaluating the impact of change management capability maturity level of construction organization on cost and time performance of building projects. Determining the CMCML of construction organizations is considered together with the project needs, client requirements in terms of cost and time savings to develop a systematic model that can facilitate strategic planning and implementation of effective working practices. When carefully put into use in construction organisations and by industrial practitioners it is believed that it will help clients and other practitioners in pre-qualification and tender evaluation. In addition it will help organisations improve their performance by easily identifying their capability areas of strength and weaknesses which improvement needs to be prioritised. Learning from mistakes is highly significant in construction projects. Project team would utilise the advantage of lessons learned in the past to approach and manage problems associated with new projects (continuous improvement).
However, Nigeria construction practise is observed to still involve the use of ineffective traditional management system Ekundayo et al. (2013). There is currently no systematic approaches to managing project change and little or no empirical research has been conducted in the areas of assessment of the change management capability maturity level of construction organisations as well as evaluation of the impact of change management capability maturity level of construction organisation on cost and time performance of building projects. Therefore, there is need for awareness in the industry on the impact which either higher or low project change management capability maturity level of construction organisations can impose on proper performance of construction projects in terms of meeting the cost budget and schedule time. It is in this regard, that this study explored change management capability maturity model of construction organisations and its impacts on cost and time performance of institutional building projects in Nigeria.
Table 1.3: Gap Analysis Between Previous Studies and This Research

<table>
<thead>
<tr>
<th>Previous studies focus</th>
<th>Present research focus</th>
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<td><strong>Areas covered</strong></td>
<td><strong>Authors</strong></td>
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<tr>
<td>1. Identification of causes of change.</td>
<td>Naif et al., (2011); Ghazal et al., (2011); Sun and Meng, (2009); Hsieh et al., (2004); Alnuaimi et al., (2010).</td>
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1.3 Research Questions

The main research question for this study is “what is the impact of construction organization’s change management capability maturity on cost and time performance of building projects in Nigeria”. The research question is further broken into the following sub-questions:
CHAPTER 1

INTRODUCTION

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The outcome of this research is capable of ensuring that, client and industry practitioners effectively pre-qualify construction organizations with adequate track record of performance in terms of cost and time. Hence, easy elimination of incompetent construction organizations is achievable and fairer competition among bidders is guaranteed. In addition, construction organizations can easily assess themselves individually in their various organizations before going for any outside bidding competition. The research outcome further provide major attributes for assessing construction organizations competency in managing project changes in construction. Consequently, the developed model in this research will create
opportunity for improvement in construction organization’s performance in terms of completing projects to time schedule and cost budget.

In conclusion, the developed model is capable of strengthened clients’ decision in given thorough consideration to the management capability maturity level as a major criterion for selecting contracting organizations for construction projects.

1.2 Problem Statement

Project change and change orders are generally common and inevitable in all stages of design and construction. They constitute major risk factors for construction projects (Sun et al., 2009). However, common consequences of project changes include cost overrun, schedule delays (Aurun, 2007; Naif et al. (2011), quality defects, conflicts and safety issues (Love et al., 2001).

Many projects failure are associated with the critical problem of project change and change orders in the industry today especially when change implementation is inconsistently managed. Motawa et al. (2007) argued that inconsistent management of project change can result in many disruptive effects of cost and time overruns. It is highly significant to identify and analyse potential project changes as early as possible to enhance the performance of project team. Early identification and analysis of project change is capable of facilitating both the assessment and implementation of projects (Ibbs et al., 2001). However, changes in construction do occur, hence a robust change management process is a prerequisite for efficient project management. The negative effects of project change will be minimised if effective change management process are put in place for the management of project changes (Ibbs et al., 2001; Motawa et al., 2007).

Moreover, project change can originate from the client, user, design consultant, project manager and contractor, hence effective management process of
this change are based on the fundamental theory of identify change, evaluate change, approve change, implement change and continuously improve from lessons learned (Ibbs et al., 2001; Hao et al., 2008). Project management team should anticipate and identify potential changes and be ready to provide necessary proactive reactions to mitigate the effect of change. Knowledge learnt from the implementation of the change process is kept for all parties to learn from it. When knowledge about previous cases is expressed by professional team it reduces the disruptive effects of change (Motawa et al., 2003).

Consequently, construction projects frequent changes coupled with inconsistent management prompted previous researchers into developing process-focused approaches (specific models and IT support systems) for managing project changes (Sun et al., 2009). Ibbs et al. (2001) developed a systematic approach founded on five basic principles for managing project change. A project toolkit that supports project team in envisaging potential changes and evaluating their impacts was mapped out by (Sun et al., 2004). Other change management tools developed for use in the management of project changes includes a fuzzy logic based change prediction model with the system dynamic model of the dynamic planning and control methodology (DPM) Motawa et al. (2007), development of a dynamics model of dynamic control methodology (DPM) for the management of unexpected events Park and Pena-Mora (2003), a change prediction framework for managing change scenarios Lee et al. (2005), and a generic procedure for issuing a change orders request (Cox et al., 1999).

Certainly, many of these models enhance change management process in construction projects. Indeed, they have potentials for further development. Nevertheless, the agitations in construction cycle for a unique methodological approach and models that enables capability maturity assessment Sarhsar (2000); Sun et al. (2009) to improve performance in building projects necessitate this study that explored change management capability maturity assessment model for construction organizations. There are many studies in literature focusing on identification of project changes, causes and effects of changes in construction, and change management process in recent years, aiming at increasing the benefits and
supporting change management, very little or no effort of these are focused to research in the area of assessment and improvement of change management capability maturity level of construction organizations to effectively manage project changes in order to enhance good performance of construction projects. Similarly, there has not been much research reported in literature on the impact of change management capability maturity level of construction organisation on cost and time performance of building projects. Project change and change orders has been established to have it direct negative impacts on such issues associated with cost overrun and schedule delays, disputes and rework (Sun et al., 2009). However, several of the generic models developed can facilitate change management process but cannot be adopted as a basis for systematic assessment and improvement (Sun et al., 2009).

Against this background, these gaps in the literature are addressed in this research project. The study focuses on developing more efficient and effective methodology of assessment and improvement of the change management capability maturity level of construction organizations in the management of project changes. In addition, the study further focuses on evaluating the impact of change management capability maturity level of construction organization on cost and time performance of building projects. Determining the CMCML of construction organizations is considered together with the project needs, client requirements in terms of cost and time savings to develop a systematic model that can facilitate strategic planning and implementation of effective working practices. When carefully put into use in construction organisations and by industrial practitioners it is believed that it will help clients and other practitioners in pre-qualification and tender evaluation. In addition it will help organisations improve their performance by easily identifying their capability areas of strength and weaknesses which improvement needs to be prioritised. Learning from mistakes is highly significant in construction projects. Project team would utilise the advantage of lessons learned in the past to approach and manage problems associated with new projects (continuous improvement).
However, Nigeria construction practice is observed to still involve the use of ineffective traditional management system Ekundayo et al. (2013). There is currently no systematic approaches to managing project change and little or no empirical research has been conducted in the areas of assessment of the change management capability maturity level of construction organisations as well as evaluation of the impact of change management capability maturity level of construction organisation on cost and time performance of building projects. Therefore, there is need for awareness in the industry on the impact which either higher or low project change management capability maturity level of construction organisations can impose on proper performance of construction projects in terms of meeting the cost budget and schedule time. It is in this regard, that this study explored change management capability maturity model of construction organisations and its impacts on cost and time performance of institutional building projects in Nigeria.
Table 1.3: Gap Analysis Between Previous Studies and This Research

<table>
<thead>
<tr>
<th>Previous studies focus</th>
<th>Present research focus</th>
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</thead>
<tbody>
<tr>
<td>Areas covered</td>
<td>Authors</td>
</tr>
<tr>
<td>1. Identification of causes of change.</td>
<td>Naif et al., (2011); Ghazal et al., (2011); Sun and Meng, (2009); Hsieh et al., (2004); Alnuaimi et al., (2010).</td>
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<tr>
<td>3. Change management system (guidance for best practice in change management)</td>
<td>CII, (1994); Cox et al., (1999); Stocks and Singh, (1999); CIRIA, (2001); Ibbs et al., (2001); Motawa et al., (2003, 2007); Hao et al., (2008).</td>
</tr>
</tbody>
</table>

1.3 Research Questions

The main research question for this study is “what is the impact of construction organization’s change management capability maturity on cost and time performance of building projects in Nigeria”. The research question is further broken into the following sub-questions:
(a) How can the change management capability maturity levels of construction organization be assessed on building projects?

(b) What is the significant contractor-related factor(s) that contributes to project change and change orders on building projects?

(c) How can the impact of change management capability maturity levels of construction organizations on cost and time performance of building projects be evaluated?

(d) How can change management capability of construction organizations’ be enhanced to improve time and cost performance of building projects in Nigeria?

1.4  **Aim and Objectives of the Study**

The aim of this research work is to investigate the impacts of change management capability maturity of construction organizations’ on cost and time performance of building projects in Nigeria. The specific objectives are:

(a) To examine change management capability maturity level of construction organizations on building projects.

(b) To determine the significant contractor-related factors that contributes to project change and change orders on building projects.

(c) To evaluate the impact of change management capability maturity levels of construction organizations on cost and time performance of building projects.

(d) To develop a model for assessing and improving construction organisations’ change management capability so as to enhance cost and time performance of building project.
1.5 Scope and Limitation of the Study

The research on change management capability maturity assessment model for construction organizations is limited in scope to the following:

(a) The study is limited to investigating the impact of construction organization’s change management capability maturity on cost and time performance of building projects in Nigeria.

(b) The perspective of construction organization is only considered in this research, meanwhile, the impact of change management capability maturity on cost and time performance from the perspective of consultant and client could be totally different when examined.

(c) The research has covered only institutional building grade 1 (one) construction organizations. Thus, the research outcome should be taken only as indicative of the impact of change management capability maturity of institutional building grade 1 (one) construction organizations.

Moreover, data collection in the research is limited to all building projects awarded and completed between 2009 and 2013 in all the Federal tertiary institutions located in the southwest geopolitical zone (i.e Ekiti, Ondo, Osun, Oyo, Ogun and Lagos states) of Nigeria, figure 1.1. The choice of south-west for the study was based on the fact that they are robustly developing economics zone in Nigeria which according to Dada (2005) has the highest concentration of construction activities. The constraints imposed by limited resources (cost and time) made available for the study as well as existing database not being readily available or accessible has made the onus of covering the entire country and long period of data storage very difficult for data collection. Similarly, the choice of educational building was further based on the premise that more newly completed building projects is available for investigation owing to the Federal Government new initiative of improving all tertiary institutions via ETF (Education Tax Fund) program of constructing new educational buildings such as Lecture theatre, classrooms, laboratories, libraries, computer lab and offices in all the tertiary institutions in the country.
1.6 Justification for the Study

In every completed project, persistent cost-time overruns due to project change and poor change management capability of contractors are experienced. Despite efforts geared towards implementing necessary control measures to stop this incessant occurrence in Nigerian construction industry, the problems still persist. Omoregie et al., (2006) reported that the cost of project in Nigeria escalated by 14% and the period of projects similarly grown up by 188%. Oladapo, (2007) found variation orders as very significant factor regularly causing cost and time overruns in Nigeria construction industry.

While a body of research exists that identify major causes of change orders and further literature search identifies a couple of causes of change orders, no research was found to exist which tends to illustrate the reason for lack of construction organization management capability for managing change and change orders. Similarly relating change management capability of construction organizations’ and cost-time performance was rarely researched by previous studies and having knowledge of these interactions may pave way for the delivery of more successful projects. Nigeria lacks empirical research in these areas of study however,
this study is the first that will quantitatively measure and rank these relationships in order to assist project parties reduce construction project problems.

This research therefore, forms a foundation on which further local and international research can be conducted. The outcome of the research will serve as evidentiary data from which other comparative studies could develop in terms of different cultural, social, political and environmental issues.

1.7 Contribution to Knowledge

This study evaluated change management capability maturity of construction organizations’ with a view of improving their management capability levels in dealing with the issues of change and change orders in construction in order to reduce problem associated with cost and time overruns.

Principally, the research is considered capable of enhancing construction practitioners’ ability via the proposed model which acts as a toolkit for assessment of construction organizations’ change management capability maturity level particularly for pre-qualification and tender evaluation exercise. Furthermore the model can be used in improving construction organizations’ management capability in dealing with the matters of change and change orders in construction projects.

Similarly, improvement of the change management capability maturity of construction organizations would have a direct impact on the issues associated with cost overrun, time delays, claims, disputes and rework since management of changes in construction is almost synonymous to management of risk. In addition, the propose model will guide contractors and other stakeholders in assessing organisational areas of strength as well as capability areas of weakness that needs improvement and urgent attention in their various organizations.
1.8 Research Methodology

In this research, quantitative research approach is adopted because of the nature of the objectives and data required. For explanatory research typical of this study, quantitative approach is mostly preferred because it is more focused with precise research question, comparative large sample size as well as testing the theory (Neuman, 2006). However, adopting quantitative approach is based on the need to obtain quality data from large participants without bias.

To accomplish the aim and objectives of the research, questionnaire survey design was adopted based on the fact that it is faster when compared with other methods and is comparatively less expensive. The targeted population for the research was categorised into two comprising: principal group of respondents (Clients, Contractors, Consultants) and the completed building projects that experienced cost and time overruns between 2009 and 2013. However, because of the specific nature of this project, all the respondents were considered to be directly related with the project and were all chosen as the research population. Therefore, because the population is sufficiently small, yhey were all considered as sample size for the research (Fellow and Liu, 2008).

The instrument adopted for data collection is the self-administered five-point Likert scale questionnaire which literature review forms the basis for it development. The questionnaire consist of 2(Two) sets (A & B). Details of the formatof the questionnaire are as described in chapter three of the research. The questionnaire was piloted among 10 construction experts and academia before it went into industry wide survey. Each set of the questionnaire was developed based on the nature of the research questions and set objectives for the research. A total of 42 questionnaires of set “A” was hand distributed to project managers, contract managers, project quantity surveyors of construction organization and 95% of these questionnaires were returned. Similarly, a total of 126 questionnaire of set “B” was administered face-to-face among consultants, contractors and clients and 80 95% response rate was recorded. However, all validly completed questionnaire returned were used for the analysis that followed.
The collected data were analysed using different statistical methods namely: descriptive analysis, correlation analysis, and fuzzy system analysis. Before adopting these methods for the analysis, collected raw data from the questionnaire were translated into numbers and arranged them into a statistical software package of “SPSS version 21” database. The developed change management capability maturity (CMCM) assessment model was validated via descriptive analysis. Details of the methodology approach is described in chapter five.

Figure 1.2: Research methodology flowcharts
1.9 Research Structure and Contents

The outline of the research can be previewed in two basic phases of pre-field and post-field activities. The pre-field phase includes those activities carried out prior to collection of data from the field. However, a post-field phase involves all the activities carried out right from the data collection stage, data analysis presentation and discussion up till conclusion and recommendation. Figure 1.3 shows the overall outline of the research which is structured into six chapters briefly described below.

(i) Chapter One: Introduction

The chapter provides general information about the research. It mainly focused on the introduction to the research topic, statement of problem, research proposition and questions, aim and objectives. Similarly, a brief description of research methodology adopted was provided.

(ii) Chapter Two: Change Management in Construction

This chapter present a review of literature on Nigeria construction industry, issue of construction project change and change orders, its causes, impacts and control measures to reduce the impacts on construction projects. Issues of change management in construction, change management processes; critical success factors in change management, and change management models in construction was also presented. In addition, the chapter discussed the management capability maturity of construction organisations to determine the influence of this factor on cost and time performance of building projects in Nigeria.

(iii) Chapter Three: Research Methodology

This chapter reports forms part of the pre-field activities, it provide necessary information on how the aim and objectives of the research was achieved. It reveals the procedures followed in the course of conducting the research. This involves decision taking in selecting the appropriate research approach, research tools,
population of the study, sampling techniques and sample size and taking final decision as to the method of analysing the data collected.

(iv) **Chapter Four: Data Analysis, Presentation and Discussion**

This chapter entails post-field activities. It involves the actual data collection and presentation of the data collected. Proper analyses of the data collected using appropriate analytical tools such as correlation; fuzzy synthetic evaluation and multiple regression analysis were carried out. In addition, findings from the study analysis were systematically reported and related to those from previous studies.

(v) **Chapter Five: Model Development**

Chapter five presents the systematic model purposely developed for the assessment and improvement of change management capability maturity level of construction organizations in Nigeria as well as guiding potential industry practitioners. The model was developed base on the theory of change management process and concept of capability maturity models (CMM).

(vi) **Chapter Six: Conclusion and Recommendations**

The chapter draws relevant conclusion from the findings as they relates to the objectives of the research as well as endeavour to answer the research questions posted. It also presents necessary recommendations for further studies. The thesis finally presents the references and appendices.
CHAPTER ONE
INTRODUCTION
Background to the Research
Statement of problem
Research Aim and Objectives

CHAPTER TWO
LITERATURE REVIEW
Change Management in Construction
Change Management Capability Maturity

CHAPTER THREE
RESEARCH METHODOLOGY
Review of Research Methods
Research Adopted in the Study

CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND DISCUSSION
Analysis, results and discussion of Objective 1
Analysis, results and discussion of Objective 2
Analysis, results and discussion of Objective 3

CHAPTER FIVE
MODEL DEVELOPMENT
(OBJECTIVE 4)
Review of Existing Model Literature
Developing Systematic model

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS
Drawing of Research Conclusions
Research Recommendations
Suggestions for future Research

END OF THE THESIS

Figure 1.3: Research structure and contents flow chart
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