EVALUATION OF NIGERIAN PUBLIC HOUSING PERFORMANCE USING OCCUPANTS’ EXPERIENCE AND SATISFACTION

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DEDICATION

I dedicate this thesis to my family for their myriad persevering, encouragement and prayers, despite the hard time they went through, which gave me the strength to withstand the obstacles embedded throughout my academic struggles. I dedicate this thesis to my parents for their understanding, encouragement and prayers to my success, despite their old age. I dedicate it to my friends that contributed immensely to the ideas used in this study. I dedicate this thesis to late Uncle Faruk, for his prayers upon foreseeing this great time, may your gentle soul rest in peace, amen. I love you all.
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Abstract

There is misconception of occupants’ satisfaction and experience in building performance evaluation due to inadequacy of in-depth studies on each, which resulted to insufficiency of facts about their structure, determinant variables, effects of socioeconomic attributes and conditions under which they are connected. Objective of the study were to identify the building performance levels and differences between occupants’ satisfaction and experience, effects of socioeconomic attributes on them and propose a framework to evaluate public housing performance using occupants’ satisfaction and experience. Building Use Studies (BUS) Methodology, UK questionnaire was adapted and used on a license agreement. Systematic random sampling was used to collect data from 300 occupants of four (4) public housing estates in Gombe metropolis Nigeria. Two independent factors of tangible and intangible building features were conceptualised. Exploratory factor analysis (EFA) was used in the pilot survey to identify the factorability of the variables. The Confirmatory factor analysis (CFA) in AMOS software was used to validate the constructs and develop two structural equation models (SEM) based on occupants satisfaction and experience. The models were subjected to multi CFA moderation method to determine the effects of socioeconomic attributes of the occupants. The results indicated differences in performance of features based on occupants’ satisfaction and experience. The SEM moderation results showed that education and income moderates occupants’ satisfaction, while they does not moderates occupants’ experience. Therefore, the study concluded with emphasis on the importance of occupants experience as an objective measure of building performance against occupants’ satisfaction’s subjectivity. Based on that, a framework to evaluate public housing performance using occupants’ satisfaction and experience was proposed.
Abstrak

# CONTENT

<table>
<thead>
<tr>
<th>TITLE</th>
<th>i</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMINER’S DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>ABSTRAK</td>
<td>vi</td>
</tr>
<tr>
<td>CONTENTS</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xiv</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xviii</td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>xxi</td>
</tr>
</tbody>
</table>

**CHAPTER 1 INTRODUCTION**

1.1 Introduction

1.2 Problem Statement

1.3 Research Questions

1.4 Aim and Objectives

1.5 Research hypotheses

1.6 Scope of the Study

1.7 Significance of the Study

1.8 Research Structure

1.9 Thesis Organisation

1.10 Summary
CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

2.2 Public Housing

2.3 Public Housing Efforts in Nigeria

2.4 Post Occupancy Evaluation (POE)
   2.4.1 Types of POE
   2.4.2 Review of existing process frameworks of POE
   2.4.3 POE benefits
   2.4.4 Summary of relevant previous studies on POE

2.5 Concepts of Performance, Satisfaction and Experience
   2.5.1 Building performance
   2.5.2 Occupants’ Satisfaction
   2.5.3 Occupants’ experience
   2.5.4 Factors affecting occupants’ satisfaction and experience

2.6 Socio-economic attributes in performance evaluation

2.7 Performance and satisfaction of building features
   2.7.1 Relation of performance and satisfaction

2.8 Building performance evaluation using occupants’ experience

2.9 Building performance evaluation methods
   2.9.1 Building Use Studies (BUS) occupant survey
   2.9.2 Soft landing
   2.9.3 PROBE method
   2.9.4 Construction Industry Council Design Quality Indicator
   2.9.5 Overall Liking Score
   2.9.6 Building Quality Assessment (BQA)
   2.9.7 Standard of House Performance Appraisal (SHPA)

2.10 Performance evaluation strategies, techniques and analysis
   2.10.1 Issues in public housing performance evaluation

2.11 Theoretical framework development for the study
   2.11.1 Theories of performance, satisfaction and experience
2.11.2 Theoretical association between satisfaction and performance 55

2.12 Conceptual frameworks development 59
2.12.1 Frameworks on factors relationship in housing evaluation 60
2.12.2 Justification for adopting theoretical and conceptual frameworks in this study 67

2.13 Approaches for research reasoning 69
2.13.1 Application of inductive and deductive reasoning approaches 71
2.13.2 Justification for applying inductive and deductive approaches 74

2.14 Gap Identified in Literature Reviewed 74
2.15 Research framework to evaluate public housing performances using occupants’ satisfaction and experience 75

2.16 Summary 78

CHAPTER 3 RESEARCH METHODOLOGY 79

3.1 Introduction 79
3.2 Research paradigms 79
3.3 Philosophical foundation of the research 80
3.4 Research approach 86
3.5 Research Strategies 87
3.6 Determination of sample 90
3.6.1 Sampling frame 91
3.6.2 Population 91
3.6.3 Sample size 92
3.7 Instruments for data collection 93
3.7.1 Pre-test 95
3.7.2 Pilot study 95
3.7.3 Field survey 101
3.8 Methods of data analyses 102
3.8.1 Descriptive analyses 104
### CHAPTER 4 DATA ANALYSIS AND RESULTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Introduction</td>
<td>118</td>
</tr>
<tr>
<td>4.2</td>
<td>Field survey questionnaire administration</td>
<td>118</td>
</tr>
<tr>
<td>4.3</td>
<td>Data screening</td>
<td>119</td>
</tr>
<tr>
<td>4.4</td>
<td>Assessment of normality and descriptive analyses</td>
<td>120</td>
</tr>
<tr>
<td>4.5</td>
<td>Socio-economic attributes of occupants</td>
<td>122</td>
</tr>
<tr>
<td>4.6</td>
<td>Building performance evaluations</td>
<td>125</td>
</tr>
<tr>
<td>4.6.1</td>
<td>Criteria for performance ranking</td>
<td>125</td>
</tr>
<tr>
<td>4.6.2</td>
<td>Performance of building components, intangible and tangible features</td>
<td>126</td>
</tr>
<tr>
<td>4.7</td>
<td>Paired t-test analysis</td>
<td>135</td>
</tr>
<tr>
<td>4.7.1</td>
<td>Paired t-test results for occupants’ satisfaction and Experience</td>
<td>136</td>
</tr>
<tr>
<td>4.8</td>
<td>Summary</td>
<td>142</td>
</tr>
</tbody>
</table>

### CHAPTER 5 STRUCTURAL EQUATION MODELLING

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Introduction</td>
<td>143</td>
</tr>
<tr>
<td>5.2</td>
<td>SEM satisfaction and experience models</td>
<td>143</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Reliability tests of constructs</td>
<td>144</td>
</tr>
<tr>
<td>5.2.2</td>
<td>PCA results for building satisfaction constructs</td>
<td>145</td>
</tr>
<tr>
<td>5.2.3</td>
<td>PCA results for building satisfaction constructs</td>
<td>146</td>
</tr>
<tr>
<td>5.2.4</td>
<td>Confirmatory factor analysis (CFA) results</td>
<td>147</td>
</tr>
</tbody>
</table>
5.2.4.1 Confirmation of building satisfaction constructs 147
5.2.4.2 Reliability and validity of measurement models for building satisfaction constructs 151
5.2.4.3 Confirmation of measurement models of building experience constructs 152
5.2.4.4 Reliability and validity of measurement models for building experience constructs 155
5.2.5 Structural equation modelling 156
5.2.5.1 Occupants’ satisfaction model 157
5.2.5.2 Occupants’ experience model 159
5.2.6 Moderation analyses 162
5.2.6.1 Effects of education on satisfaction 162
5.2.6.2 Effects of education on experience 166
5.2.6.3 Effects of income on satisfaction 168
5.2.6.4 Effects of income on experience 171

5.3 Summary 174

CHAPTER 6 CONCLUSION AND RECOMMENDATION 175

1.1 Introduction 175
1.2 Proposed framework for POE evaluation 175
1.3 Contributions and recommendations of the study 178
1.3.1 Theoretical contribution 179
1.3.2 Methodological contribution 179
1.3.3 Practical contribution 180
1.4 Limitations of the study 182
1.5 Suggestions for further studies 183
1.6 Overall conclusion 183
6.7 Novelty of the study 184

REFERENCES 186

APPENDICES 212
VITA

List of publications and awards
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Reasons for public housing developments</td>
<td>12</td>
</tr>
<tr>
<td>2.2</td>
<td>Types of post occupancy evaluation</td>
<td>20</td>
</tr>
<tr>
<td>2.3</td>
<td>Benefits of POE</td>
<td>27</td>
</tr>
<tr>
<td>2.4</td>
<td>Factors affecting occupants satisfaction and experience</td>
<td>35</td>
</tr>
<tr>
<td>2.5</td>
<td>Summary of research framework to evaluate public housing performance using satisfaction and experience</td>
<td>76</td>
</tr>
<tr>
<td>3.1</td>
<td>Available facilities</td>
<td>96</td>
</tr>
<tr>
<td>3.2</td>
<td>Descriptive and normality test of building experience constructs</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>Pilot Survey (n=102)</td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td>Descriptive and normality test of building satisfaction constructs</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>Pilot survey (n=102)</td>
<td></td>
</tr>
<tr>
<td>3.4</td>
<td>Exploratory factor analysis for pilot study</td>
<td>100</td>
</tr>
<tr>
<td>3.5</td>
<td>Reliability of pilot results</td>
<td>101</td>
</tr>
<tr>
<td>3.6</td>
<td>Index category and levels of acceptance</td>
<td>109</td>
</tr>
<tr>
<td>3.7</td>
<td>Organisation of datasets and models for moderation analysis</td>
<td>115</td>
</tr>
<tr>
<td>4.1</td>
<td>Questionnaire administration</td>
<td>119</td>
</tr>
<tr>
<td>4.2</td>
<td>Descriptive and normality test of building satisfaction constructs</td>
<td>121</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>4.3</td>
<td>Descriptive and normality test of occupants’ experience constructs</td>
<td>122</td>
</tr>
<tr>
<td>4.4</td>
<td>Profile of housing occupants</td>
<td>124</td>
</tr>
<tr>
<td>4.5</td>
<td>Seven (7) Likert scale criteria for building performance ranking</td>
<td>125</td>
</tr>
<tr>
<td>4.6</td>
<td>Summary of research objective 1 presentation</td>
<td>127</td>
</tr>
<tr>
<td>4.7</td>
<td>T-test result for building components</td>
<td>136</td>
</tr>
<tr>
<td>4.8</td>
<td>T-test result for intangible features</td>
<td>138</td>
</tr>
<tr>
<td>4.9</td>
<td>T-test result for tangible features</td>
<td>139</td>
</tr>
<tr>
<td>4.10</td>
<td>T-test result for building components, tangible and intangible</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>features as a whole</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Cronbach’s alpha</td>
<td>144</td>
</tr>
<tr>
<td>5.2</td>
<td>PCA results for building satisfaction constructs</td>
<td>145</td>
</tr>
<tr>
<td>5.3</td>
<td>PCA results for all constructs</td>
<td>146</td>
</tr>
<tr>
<td>5.4</td>
<td>Reliability and validity of building satisfaction measurement models</td>
<td>152</td>
</tr>
<tr>
<td>5.5</td>
<td>Reliability and validity of building experience measurement models</td>
<td>156</td>
</tr>
<tr>
<td>5.6</td>
<td>Parameter estimates for final structural model of occupants’</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td>satisfaction</td>
<td></td>
</tr>
<tr>
<td>5.7</td>
<td>Parameter estimates for final structural model of occupants’</td>
<td>162</td>
</tr>
<tr>
<td></td>
<td>experience</td>
<td></td>
</tr>
<tr>
<td>5.8</td>
<td>Moderation test for high education in satisfaction model</td>
<td>163</td>
</tr>
<tr>
<td>5.9</td>
<td>Moderation test for low education in satisfaction model</td>
<td>164</td>
</tr>
<tr>
<td>5.10</td>
<td>Moderation test for education in satisfaction model</td>
<td>165</td>
</tr>
</tbody>
</table>
5.11 Moderation test for high education in experience model

5.12 Moderation test for low education in experience model

5.13 Moderation test for education in experience model

5.14 Moderation test for high income in satisfaction model

5.15 Moderation test for low income in satisfaction model

5.16 Moderation test for income in satisfaction model

5.17 Moderation test for high income in experience model

5.18 Moderation test for low income in experience model

5.19 Moderation test for income in experience model

5.20 Standardized regression weights and significance in satisfaction model

5.21 Standardized regression weights and significance in experience model
LIST OF FIGURES

2.1  POE process by PROBE 22
2.2  Development process of the evaluation model 23
2.3  Post occupancy evaluation phases 24
2.4  Phases of performance evaluation 25
2.5  Relationship between performance, experience and satisfaction 34
2.6  Conceptual framework of public housing 36
2.7  Four alternative models of satisfaction 40
2.8  Causal diagram representing the effect of building type on occupant comfort and satisfaction 61
2.9  Student satisfaction framework 61
2.10 System approach to user satisfaction 62
2.11 Research framework for housing satisfaction 63
2.12 Theoretical and conceptual frameworks for evaluation of public housing programmes 64
2.13 Relationship between building features considered for this study 65
2.14 Framework showing relationship between performance, satisfaction and experience 67
2.15 Inductive and deductive reasoning in the study

2.16 Research framework to evaluate public housing performance using occupants’ satisfaction and experience

3.1 Research paradigm flow chat

3.2 Philosophical assumptions verses schools of thought

3.3 Process framework of study

3.4 Research analysis plan

4.1 Building components’ performance and satisfaction

4.2 Intangible features performance and satisfaction

4.3 Tangible features performance and satisfaction

4.4 Building performance and satisfaction

5.1 First iteration for BSC measurement model

5.2 Second iteration for BSC measurement model

5.3 Third iteration for BSC measurement model

5.4 First iteration for IBSC measurement model

5.5 Second iteration for IBSC measurement model

5.6 First iteration for TBSC measurement model

5.7 Second iteration for TBSC measurement model

5.8 First iteration for BEC measurement model

5.9 Second iteration for BEC measurement model
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.10</td>
<td>CFA for IBEC measurement model</td>
<td>154</td>
</tr>
<tr>
<td>5.11</td>
<td>First iteration for TBEC measurement model</td>
<td>154</td>
</tr>
<tr>
<td>5.12</td>
<td>Revised iteration for TBEC measurement model</td>
<td>155</td>
</tr>
<tr>
<td>5.13</td>
<td>First occupants’ satisfaction structural model</td>
<td>157</td>
</tr>
<tr>
<td>5.14</td>
<td>Revised occupants’ satisfaction structural model</td>
<td>158</td>
</tr>
<tr>
<td>5.15</td>
<td>First occupants’ experience structural model</td>
<td>159</td>
</tr>
<tr>
<td>5.16</td>
<td>Second occupants’ experience structural model</td>
<td>160</td>
</tr>
<tr>
<td>5.17</td>
<td>Revised occupants’ experience structural model</td>
<td>161</td>
</tr>
<tr>
<td>6.1</td>
<td>A proposed POE framework to evaluate public housing performance</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>using occupants’ satisfaction and experience</td>
<td></td>
</tr>
</tbody>
</table>


LIST OF APPENDICES

A  Pilot survey questionnaire  212
B  Field survey questionnaire  217
C  Overview of POE studies on residential buildings  221
D  Sources of variables  227
E  Research assistants and questionnaire sample  229
F  Sample of housing units  230
G  Boxplot  231
CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Public housing is provision of low cost housing by government for civil occupancy. Even though public housing development policies are geared toward satisfaction of housing occupants, experience of building users were highly ignored in real estate development process especially in public sector. This is because Public housing policy structure tends to favour architects preferences, with overall target of low costing, while there is need for buildings to serve the needs of people who use them (Watson, 1999; Kasim, Ahmad & Eni, 2006). It brings to light, the inadequate opportunity given in public housing development where design and construction teams can share knowledge with occupants, while such knowledge are imperative, because all the stakeholders come from different backgrounds and try to achieve different goals (Kaatz et al., 2005). Such occupants’ views were derived through post occupancy evaluation (POE) methods, which is the medium of communication between design team and occupants.

POE refers to evaluation of performance of building after occupancy with sole objective of understanding interaction between the property and occupants so that improvement is made (Nawawi & Khalil, 2008). POE uses human behaviour such as satisfaction, perception or experience, to evaluate physical, environmental and management factors that influence actual performance of buildings (Wheeler et al.,
As buildings evaluation is multi disciplinary in use, it involves architects, building engineers, facility managers and services engineers. It is used in multi disciplinary areas of design, psychology, economics planning, sociology and engineering. Data collection processes include survey, laboratory analysis and physical survey and interviews, depending on professional area of study and intended use of the results (Leaman et al., 2010a).

Resultant effect of this lack of consideration to occupants’ views in public housing developments is vividly seen in shortcomings of present residential building performance evaluation frameworks. It was evidenced from literature that little attention is given to residential building evaluation (Leaman, Stevenson & Bordass, 2010b). More attention is given to offices and educational buildings, while residential building performance evaluation was supposed to be a key instrument of collecting data that can show the importance of collective participation and improve performance of housing developers and public housing policies (Mohit & Azim, 2012). Failure to adequately learn by evaluating existing building stock effectively results to a failure to avoid avoidable errors. Therefore, occupants’ participation in reporting their experience or satisfaction is an important step toward improving housing delivery, policies and maintenance to sustainable stage (Ozturk, Arayici, & Coates, 2012).

Hence, there have been strong reasons for POE studies, as actual performance of building often differs from initial design intention (Djebarni & Al-Abed, 2000), POE provides a focus for identification of factors responsible for variation in housing performance (Kaatz et al., 2005). Therefore, POE has demonstrated the importance of taking all aspects of property life cycle as important elements in housing performance survey. Even after development, housing performance in respect to operation and maintenance has to be monitored and best practice is where monitoring and hence collected feedbacks were effectively utilised in improvement (Way & Bordass, 2005).

This portrayed the need for a framework, which can provide a guide to be conducting POE periodically to identify opportunities and pitfalls and to improve overall housing performance (Cohen et al., 2001). It is equally important to incorporate many tools of assessment in POE especially psychological elements such as experience,
satisfaction and perception, to give a clear direction of human dynamic behaviours in respect to public housing and create room for improvement where prediction of design team failed (Turpin-Brooks & Viccars, 2006).

1.2 Problem Statement

Public houses are normally prediction of a shelter that meets human basic needs of habitation. Therefore, prediction can be right in some areas and wrong in others. Post occupancy evaluation (POE) is method used to identify these areas of strengths and weaknesses. However, literature on available POE studies revealed serious limitations in scope of previous studies (Ibem & Amole, 2010). Authors complained of failure in previous evaluation studies to significantly cover relevant important aspects of public housing performance and satisfaction. For instance, little is known about relevance of intangible building features (Non physical) such as ventilation, privacy and lighting in public housing performance and satisfaction (Gann, Salter & Whyte, 2003, Sinou & Kyvelou, 2006). Effects of socioeconomic attributes of occupants on satisfaction and performance were also over looked in building performance evaluation (Sinou & Kyvelou, 2006; Stevenson & Leaman, 2010).

Some of the repercussions of those shortcomings were the gaps reported between design intent and final performance of buildings after occupation especially in developing countries like Nigeria (Loftness et al., 2009; Eni, 2015). In addition, fewer residential housing performance studies were reported in journals when compared to other areas like offices and educational properties (Djebarni & Al-Abed, 2000; Stevenson & Leaman, 2010), due to insufficient studies in the area. This led to inadequate knowledge of how public houses are performing after occupation, which could have provided a guide for future developments. Another problem was misuse of the concepts of performance and satisfaction. Implication of failure to ascertain the factor structure of satisfaction and performance constructs is misprioritisation of
attributes which lead to misallocation of resources for improvement (Busacca & Padula, 2005). Little attention given to occupants’ safety and health issues were also among the areas where shortcomings of present housing performance evaluation are visible in Nigeria (Ibem, 2011; Ibem & Amole, 2010). Health shock at birth, gastrointestinal system problems, respiratory symptoms and fever were all reported to have link with poor quality houses and provision of inadequate utilities in houses and neighbourhoods (Curtis et al., 2010; Afolabi et al., 2012). All the above contentions could have been averted, with proper housing performance evaluation framework. Such framework needs to be all encompassing to accommodate differences identified between building performance and satisfaction (Schwab & Cummings, 1970).

Several authors (Swan & Combs, 1976; Tse & Wilton, 1988; Oliver & Desarbo, 1988) have argued that satisfaction and performance are different concepts and should be treated individually. Possibly this is because satisfaction is an inferential view on performance. Satisfaction indicates the housing ability to fulfil the occupants’ pleasurable level of consideration or use. Performance in this context is ability of building to achieve its predefined objectives of housing. Therefore, occupants experience seems to indicate performance more objectively than satisfaction. The difference between satisfaction and experience is degree of failure to achieve a complete and absolute declaration of reality. While satisfaction is emotional or sentimental opinion about how occupants perceived performance, experience is unlike satisfaction, is not qualified by subjective interpretation. Experience is feelings, though, reflection or cognition which resulted from direct contact between the subject (occupants) and the object (house). Therefore in experience there is complete reference to reality, hence indicates objective performance. Therefore, occupants acquire experience first when they get in contact (occupy) with the house. As a result of this contact, sensory organs will register experience with the building features. This is termed objective performance. Thereafter, the issue of whether the occupant is satisfied with the building features performance follows.

Therefore, satisfaction went further to indicate whether the occupants experience with the building is pleasant or not. Hence, satisfaction is moderated performance
opinion, which is achieved when the building performance achieved occupants’ social values, determined by socioeconomic attributes. These socioeconomic attributes, which comprises of income, education, culture, age and gender, influence occupants’ satisfaction (Amole, 2009; Cole & Brown, 2009). This implied that irrespective of the objective (real) performance achieved by building features, the occupants’ satisfaction can be bias. Hence, this called for caution in interpretation of satisfaction is performance preposition. Building features may performance based on the design parameters but it may not satisfy some class of people due to their socioeconomic attributes. This is why public housing performance evaluation framework need to capture this moderation effect of socioeconomic attributes. As public houses were designed for low income occupation, high income occupants will report dissatisfaction with the houses, even if their experience with the real performance of the building features is positive. Hence, this study fills the above gap by proposing a framework for public housing performance evaluation using occupants’ satisfaction and experience. It was based on theory in Schwab & Cummings (1970), which identified satisfaction and performance as different constructs, and were moderated by some variables (socioeconomic attributes) at different levels. It involved identifying difference between satisfaction and performance (based on experience), and confirmation of socioeconomic attributes moderation effects on occupants’ satisfaction and experience using structural equation models (SEM).

The SEM models need dependent and independent factors, hence the building features were divided into two; building components which are dependent and building features which are independent. Building components comprises of building accommodation such as rooms, kitchens and toilets. The independent features were divided into tangible and intangible building features. Tangible building features include floor, ceiling, walls and lighting facilities, while intangible building features are privacy, ventilation and lighting. Hence, performance evaluation framework could served as a guide, which can indicate the performance of the houses based on relationship between independent building features (tangibles and intangibles) and dependent building components.
1.3 Research Questions

Based on the above statement of problem, this study answers questions;

i. What is the level of occupants’ satisfaction and experience with the performance of public housing in Nigeria?

ii. Do socioeconomic attributes of income and education influence occupants’ satisfaction and experience in public housing performance evaluation in the study area?

1.4 Aim and Objectives

In consistence with research background and problem statement discussed above, aim of this study is to propose an evaluation framework for public housing performance using occupants’ satisfaction and experience in the study area. To achieve the above mentioned aim, following objectives were forwarded;

i. To determine level of occupants’ satisfaction and experience with performance of public housing features in the study area.

ii. To assess influence of socioeconomic attributes of income and education on occupants’ satisfaction and experience in public housing performance evaluation in the study area.

iii. To propose a POE framework for public housing performance using occupants satisfaction and experience.
1.5 Research hypotheses

i. There is significant difference between occupants’ satisfaction and experience with performance of public housing in Nigeria.

ii. Socioeconomic attributes of income and education influence occupants’ satisfaction and experience in public housing performance evaluation in the study area.

1.6 Scope of the Study

This study covered only public houses located in Gombe metropolis Nigeria. There are different forms and mechanisms in housing development in Nigeria in general and Gombe metropolis in particular. There are private informal houses, organised private sector houses, and public sectors houses. Private informal houses were developed by individuals, usually on land acquired through market purchase or grant by government. The houses were mostly owner occupier or for rentals. Organised private sector houses were developed by private liability companies either using bank loans or public-private partnership. Institutionalised houses were developed by government agencies or private corporate bodies which were mainly for staff use. Then there are public houses which were developed by government agencies or public liability companies on behalf of government but sold to private individuals on owner occupier bases. This study examines the last group, as they are public houses developed for people use.

The focus of this study was to evaluate difference between occupant’s satisfaction and experience on performance of public houses and propose an evaluation framework for public housing performance using occupants’ satisfaction and experience in the study area. Therefore, this study measure occupants’ satisfaction and experience
on physical (called tangible), non physical (called intangible) and building accommodations (called component) factors. Occupants’ socio-economic attributes such as education status and income level were also examined to determine their influence on experience and satisfaction of the occupants.

Meanwhile, expected respondents to instruments of data collection for this study are occupants’ of public houses in the study area. As the houses were developed in clusters called ‘housing estate’ with prototype units in different combination of 1-bedroom, 2-bedrooms, 3-bedrooms in each housing estate, the study covers housing estates irrespective of number of rooms per unit.

1.7 **Significance of the Study**

This research is significant not only to government as developer and provider of public estates, but also to private real estate developers, facility managers, occupants of such estate and researchers based on the fact that;

a. It provided feedback on actual performance of public housing estates upon which new public estate developments could be designed and constructed by government.

b. It portrayed the difference between housing performance based on occupants’ satisfaction and experience for caution in future usage.

c. Findings of this study can help government in formulating strategic housing development policies that would meet demands of potential beneficiaries.

d. It also helps to provide strategy through which occupants can be empowered to negotiate their housing needs.

e. It also helps private real estate developers to see a prospect in providing alternative housing estates that meet requirements of prospective occupants.

f. It provides guidance for future research in the study area of POE.
1.8 Research Structure

Research structure is an overview of how the study was planned; procedures, data collection techniques, statistical tools for analysis and reporting of data. Reporting covers contents discussed in various chapters of research report. Research structure in other words, is an outline or a scheme that serves as a useful guide to researcher in his effort to generate data for study. For the purpose of this research, data regarding occupants’ level of satisfaction and experience with performance of various elements of the houses were required. In the same vein, socio-economic attributes of occupants were also important as they can influence occupant’s level of satisfaction with performance of tangible and intangible features of the house. Data was collected using questionnaire. Collected data was analysed using t-test, mean ranking and Structural Equation Modelling (SEM) then presented in tabular form and descriptively explained. Summary of findings recommendations and conclusion was then forwarded to serve as a yardstick for future studies.

1.9 Thesis Organisation

General introductory elements of this study were explained in chapter 1. This comprises of background of study, statement of research problem, research questions, aim and objectives of study, scope of study and relevant significance of the study.

Relevant literature on conceptual framework and previous studies on the topic were reviewed and presented in chapter 2. Research framework development was also discussed in Chapter 2. These include theoretical framework development, theories of performance, satisfaction and experience, conceptual framework development and reasons for adopting inductive and deductive continuum.
Methodology of study appears in chapter 3. It comprises of detail explanation on population of study, sample and sampling technique, instruments of data collection, method of data presentation and analysis as well as justifications for using each method mentioned above.

Descriptive data analyses on building performance levels and differences between occupants’ satisfaction and experience were presented in chapter 4. Data on occupants’ satisfaction and experience were analysed using mean ranking and t-test. Chapter 5 presented the results for modelling. SEM was used to evaluate effects of socio-economic attributes of occupants on satisfaction and experience with performance of public houses.

Discussion of results of findings, conclusion and recommendations appeared in chapter 6. This comprised also of discussion of findings, whereby major findings were compared with previous relevant findings in other studies to identify areas of disparity and forward the reasons for disparity.

1.10 Summary

Chapter 1 discussed preliminary overview of the major background ideas that leads to the purpose of carrying out this research. As this chapter revealed how previous studies fell short of evaluating in-depth the public housing performance evaluation based on satisfaction and experience, the chapter justified the need to find out the occupants satisfaction and experience with performance of public housing. The chapter explained potential beneficiaries of the research as well as the areas of the benefits. It serves as foundation upon which understanding of what the research is all about was built. Next chapter 2 on literature review was based upon this foundation. Chapter 2 presented relevant literature reviewed, arranged according to the concepts relevant in the study. These include the concept of public housing, post occupancy evaluation (POE), performance, satisfaction and experience.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the underpinning concepts and relevant literature on the study. It highlighted meanings, methods, types and other features of the basic concepts of this study. The chapter was organised based on the information flow of the literature reviewed. It started from identifying meaning of public housing and its implications. The chapter then explained previous efforts in public housing developments in Nigeria. Meaning and methods of POE were then discussed and concepts of satisfaction, experience and performance were elaborated. Concept of occupant’s satisfaction and experience were discussed together with their implication to public housing performance evaluation. Relevant literatures used in developing building performance and satisfaction constructs were discussed. Justification for using building performance evaluation using occupants’ experience and building performance evaluation methods were explained. Strategies, techniques and statistical analysis methods used in previous studies on Performance evaluation were discussed. The chapter was closed by elaborating issues in public housing performance evaluation and brief conclusion.
2.2 Public Housing

Public housing is a form of housing provision method whereby the property is developed by a government authority, which may be central or local for people use (Hutchison, 2009). Continuing challenges posed by unprecedented urbanization in developing countries, including Nigeria, is the provision of adequate, qualitative and affordable housing. Over the last three decades, Nigeria, like several developing countries, has emphasised public housing schemes with the expectation of ripening its benefits such as affordability (Adejumo, 2008).

Cases for public provision of subsidized housing have traditionally rested on three main reasons. These were presented in Table 2.1. The table indicated redistribution of resources, standard control and public service delivery as the reasons behind public housing developments.

Table 2.1: Reasons for public housing developments

<table>
<thead>
<tr>
<th>S/N</th>
<th>Reasons</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Redistribution of resources, which assumes that certain groups in society, for a variety of reasons, are likely to under-consume housing and remain ill-housed in spite of quite high levels of public spending on income support. Includes rural and urban development thereby ensuring even development throughout the country</td>
<td>(Balchin et al, 1995) (Badejo, 2005)</td>
</tr>
<tr>
<td>2</td>
<td>To ensure that a minimum standard of housing consumption is established and maintained. Poor housing standards represent and environmental health risk. Public supply of low-cost housing may thus be seen partly as an alternative to controlling standards at lower end of private housing (and rented) sector. It correct or prevent market failures in terms of interest rate control, tax waiver, exchange rate management Public service of providing sufficient housing of suitable standard directly, at an affordable and controlled cost and quality to residents</td>
<td>Sheppard (2011); Elgin (2010); Lee &amp; Chan (2010); Balchin et al. (1995)</td>
</tr>
<tr>
<td>3</td>
<td>To ensure housing delivery stability in the areas of material supply subsidies and affordability. This can bridge the housing gap through effective planning, monitoring and evaluation, and sustain the huge capital outlay requirements and financial mobilization Help housing policy design in terms of Institutional development and assistance, budgetary support for housing and user satisfied houses</td>
<td>Badejo (2005)</td>
</tr>
</tbody>
</table>
The reasons for public housing developments mentioned above revealed that there are areas of comparative advantage between public and private sectors in provision of user satisfied public housing. The public sector has better advantage in supply of development land, regulating housing market indices such as interest rates, tax and exchange rates, initiating price, subsidies, formulation and implementation of housing policies and regulations and regulating output distribution between urban and rural areas. On the other hand, the private sector has better comparative advantages in the areas of effective mobilisation, management and control of development funds as in capital market, efficient utilisation of human and capital resources, effective and profitable property management and disposal devices such as outright sales, rentals, etc.

Therefore, the role of both public and private sectors in bridging the gap in housing development cannot be overemphasis. The two sectors must work together in alternation to ensure effective, profitable and at the same time qualitative and affordable housing development. Public sector should centre on areas of its best comparative advantages such as provision of development land, regulating market indices that can affect housing delivery and allow the private sector to carry out the construction and disposal stages under a public controlled regulation and policies.

### 2.3 Public Housing Efforts in Nigeria

Efforts were made by government at different levels to provide adequate, affordable and qualitative housing in Nigeria. Some of these efforts were dated back to colonial era. However, a periodic review of government efforts especially at federal level, to curtail problems of housing shortage can be summarised based on two time frames of Housing Development before Independence and Housing Development after Independence.

Since pre - independence era, various governments have tried as much as possible to provide housing for some categories of people depending on government’s priority. Colonial administrators restricted this to government officials by laying-out
Government Residential Areas in some selected major urban centres. Meanwhile only one scheme was introduced to local people, which was African Staff Housing Scheme, aimed at providing housing loan to Senior Civil Servants. In 1928, Lagos Executive Development Board (L.E.D.B) was inaugurated, primarily to clear slums and ghettos in Lagos. Also Government created Mortgage Corporation known as Nigerian Building Society (N.B.S.) in 1956, which is now Federal Mortgage Bank of Nigeria (FMBN) to provide loan for any prospective home-occupier who can afford to pay some certain deposit laid down by the board at a particular interest rate (Akewusola, 2006).

After Independence in 1960, LEDB constructed some houses in Surulere to resettle evacuated people from Isale-eko for facelift of the area. Some houses were also constructed at Ogba-Oluwole Housing Scheme to resettle thousands of people from Olowogbowo and Oluwole areas in Lagos Island. The housing units were allotted to people on perpetual tenancy. In May 1972, Federal Government Staff Housing Board was established taking over the African Staff Housing Scheme of the Colonial era. The board was empowered to grant loans to eligible members of public service, amounting to five times applicant’s annual salary or N20, 000 whichever is less for the construction, purchase or improvement of their own houses, which was subjected to revision (Akewusola, 2006).

Federal Housing Authority (FHA) was established in 1973 to handle responsibility of initiating and executing Federal Government Housing Programmes. Apart from programme set out by Federal Housing Authority, all states in the Federal have their own Housing Corporations to compliment the efforts of Federal Housing Authority. Effect of National Development Plan (NDP), which was five year economic planning as an instrument for effective development of national income in first twelve years of independence (1960-1972), was very limited concerning housing problems. Second and third NDP which has major objective of ensuring that all Nigerians have a right a relatively clean, safe, healthy and habitable accommodation took various steps for translation of these objectives among which are:

a. Allocation of N500 million by Federal Military Government in 1972/73 for provision of 59,000 housing units for low income people throughout the Federation.
10,000 units were planned for Lagos while 4,000 units each were for other eleven state capitals then.

b. FMBN was granted a capital of N1.06 million in 1974/75 and officially converted to Mortgage Bank and was asked to reduce interest on loans granted to public from 8½% to 6½% (Akewusola, 2006).

In 1975, Federal Ministry of Housing, Urban Development and Environment was created to initiate policies and provide leadership in all matters related to housing, urban development and environment. A substantial sum of N1.86 million was allocated for housing development during 1975/80 – plan period. Ademiluyi & Raji (2008) revealed that between 1975 and 1980, there was a plan of delivering 202,000 housing units to public but only 28,500 units, representing 14.1% were achieved.

In 1977, after Nigeria successfully hosted second All-Blacks and African Festival of Arts and Culture (FESTAC’77), accommodation provided for contingents in form of large estate tagged “Festac Town” was allocated by ballot, to Nigerians after the festival was held in February of that year. The town, which was to occupy about 1,700 hectares of land when fully developed according to plan and to house a population of not less than 120,000 people in about 24,000 housing units of various categories. Housing categories, built on owner-occupier basis, range from one, two, three and four bedroom apartments to duplexes and bungalows. A duplex costs about N6, 000 payments in 30 years at a yearly interest rate of 3% or a monthly rent of N238.43k (Akewusola, 2006).

Between 1979 and 1983, civilian government tried to ease housing problem especially to less privilege citizens. In 1980, National Council on Housing and Environment adopted National Housing Policy. This policy recognized right of each state to formulate its own housing policy programme, but it must be co-ordinated by Federal Ministry of Housing from time to time. This National Policy on housing among others provided for:

i. Housing financing.

ii. Rent control.

iii. Preparation of basic typical designs and construction guidelines.

iv. Site and services project and squatters upgrading.
v. Constant review of Land Use Act.

Federal Government constructed some flats all over the Federation during this period. All state governments complimented efforts of Federal government by building low and medium income housing units for their citizens. Ademiluyi & Raji (2008) unearthed that out of 200,000 housing units planned to be delivered between 1981 and 1985, only 47,200 (23.6%) was constructed.

Next major effort was made in 1990. Federal Government launched a new comprehensive housing policy as a result of disillusionment with all previous executed housing programmes that failed to proffer any effective solution to housing problems. The goal of this was to ensure that Nigerians own or have access to decent housing accommodation at affordable cost by year 2000. Akewusola (2006) quoted Federal Ministry of Works and Housing saying that, quantity of this goal was production of about 700,000 housing units per year to meet the target of 8 million units by year 2000. Documents indicated that not less than 60% of the new houses were to be built in urban centres (Ademiluyi & Raji 2008).

Parts of its strategies to ensure the success of this policy were:

a. Removal or review of restrictive laws and regulations on land use, survey, building plans and construction so as to facilitate housing delivery;

b. Strengthening (legal and financial roles) of Local government participation in housing development;

c. Transformation of Federal Mortgage Bank to apex mortgage institution through which housing fund shall be channelled to numerous Primary Mortgage Institutions and lending agencies to be licensed for easy access to all individual and groups for housing loan;

d. Vigorous promotion of functional housing designs and research into abundant local building materials to reduce and provide housing units at affordable cost;

e. Encouragement of philanthropic organizations and private sector to produce low cost housing units through adequate incentive packages;

f. Strengthening of monitoring and evaluation of housing policy.
Also in 1994, Federal Military Government through Ministry of Works and Housing designed National programme on housing for 1994/95. It was planned to construct a total of 121,000 Housing Units for low, Medium, Upper-medium and High-income citizens in all 30 states of the Federation then and Abuja. Designated period of the programme was two years (1994-1995) with Federal Housing Authority as executing agency (Rees, 2009). Ajanlekoko (2001) concluded by quoting CBN (1994 and 1998) and Vision 2010 Main Reports saying that out of 121,000 housing units slated to be built between 1994 and 1995, only 1,014 houses were completed. Ademiluyi & Raji (2008) summarised it that less than 5% was achieved.

Those were the major government’s efforts in carrying out direct housing development in Nigeria in pre-colonial and post-colonial era. Period from 1999 to 2015 witnessed government withdrawal from direct housing development, to the provision of an enabling environment. But despite all these interventions and huge investments in housing provisions since the colonial times and to date, Nigeria’s housing problems still remain intractable. In fact, access to decent shelter has worsened for increasing segments of urban population in Nigeria as seen above. In 2006, minister of Housing and Urban Development admitted that the country needs about 10 million housing units before all Nigerians can be sheltered (Ademiluyi & Raji, 2008).

2.4 Post Occupancy Evaluation (POE)

POE was cited by Shen, Shen, & Sun (2012) as a process of evaluating building in an organised and thorough way after it has been in occupation for some time. Term POE was said to have originated from occupancy permission given to certify that a property is fit for occupation (Riley, Kokkarinen & Pitt, 2010). Collections of occupants’ view of buildings were introduced by Royal Institution of British Architects (RIBA) and were incorporated in RIBA First handbook in 1965 (Baird et al., 1996). Building Performance Research Unit (BPRU) at university of Strathclyde was sponsored by RIBA, architects'
journal and ministry of public buildings and works to carry out POE researches. Outcomes of the studies were published in RIBA journals. It was argued that feedback programme was more academic than practicable (Riley et al., 2010).

Building a POE was incorporated in RIBA plan of work a part M, but was later removed as clients complained that they cannot sponsor POE exercise as it may mainly benefit future buildings than their own. Therefore it was left to scholars to venture into its studies. In 2006, it was re-instated again as stage M into RIBA plan of work as a result of the needs for quality and sustainable development (Turpin-Brooks & Viccars, 2006). Development of POE process continued in 1994 as a result of change in funding sources of feedback. A team of experts was formed and named Post Occupancy Review of Building and Their Engineering (PROBE). It was a multidisciplinary group comprising researchers, publishers and practitioners. The studies were mostly carried out on office buildings. Turpin-Brooks & Viccars (2006) cited that the exercise was not taken into consideration as only 1 out of 14 recommended re-evaluation was carried out. Riley et al. (2010) also cited Fisk (2001) saying that studies carried out by PROBE failed to tackle all sustainability indicators and occupation styles into consideration during the review.

PROBE was a research programme sponsored by a UK government and builders group between 1995 and 2002. The study aimed to collect data on different POE studies carried out between that periods of time and published for public, to help interested professionals to utilise them (Riley et al., 2010). About 20 POE results were published with other papers reviewed. That was a giant effort, as it provided for first time, an opportunity for subsequent publications. PROBE provided an opportunity for British council for offices guide to review the questionnaire interviews and other techniques of PROBE. PROBE has also made POE process affordable and available for different group of users.

Relatively better recognition and application of POE was reported in USA Federal Facilities Council (2001) in Wheeler et al. (2011). POE was accepted as a tool for sustainable development which led to development of building database. Scholars also embark on studies using developed analytical tools and computer based analysis
tools, which go through a rigorous validation process that includes analytical testing and empirical validation. Gradual development of academic research studies has incorporated performance analytical tools with satisfaction methods and indices to generate optimum building policies, designs, construction methods, materials, services and maintenance for different building uses. However despite research efforts made, discrepancies still exist between optimised new developments and their actual performance, which mostly need redesign to meet objectives of development. Such failures may result from inherent shortcomings of analytical tools such as mathematical assumptions associated with them or inability of evaluation team to ascertain the actual characteristics of building and the occupants. This is because some of the users or indices are dynamic (they change with time). Some of those attributes are income, family size, age, occupation and health, which can invariably influence occupants' satisfaction with building. Some of the programmes in UK that encourages application of POE in future sustainable development issues were cited by Turpin-Brooks & Viccars (2006) as Rethinking construction (construction excellence), demonstration project M14 (movement for innovation), and government planning framework (including PPG22) etc.

2.4.1 Types of POE

Three types of POE were identified by Preiser (2001) in Turpin-Brooks & Viccars (2006) as Indicative, Investigative and Diagnostic Evaluations. It was cited that the types that can be adopted for a particular study depend on finance, time, manpower and expected outcomes. All three types share the same process of planning, execution and interpretation which were summarily discussed in Table 2.2.
Table 2.2: Types of post occupancy evaluation (Turpin-Brooks & Viccars, 2006)

<table>
<thead>
<tr>
<th>Level of POE</th>
<th>Aims</th>
<th>Methods</th>
<th>Timescale</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicative</td>
<td>Assessment by experienced personnel to highlight POE issues</td>
<td>Walk through evaluation. Structured interviews? Group meetings with end-users? General inspection of building performance? Archival document evaluations?</td>
<td>Short inspection period</td>
<td>Quick, simple, not too intrusive/disruptive to daily operation of building. Judgemental and overview only?</td>
</tr>
<tr>
<td>Investigative</td>
<td>In-depth study of building’s performance and solutions to problems</td>
<td>Survey questionnaires and interviews. Results are compared with similar facilities. Report appropriate solutions to problems</td>
<td>From one week to several months</td>
<td>In-depth/useful results. Can be intrusive/time-consuming, depending on number of personnel involved</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>Show up any deficiencies (to rectify) and collect data for future design of similar facilities</td>
<td>Sophisticated data gathering and analysis techniques Questionnaires, surveys, interviews and physical measurements</td>
<td>From several months to several years</td>
<td>Greater value in usability of results. More time consuming</td>
</tr>
</tbody>
</table>

2.4.2 Review of existing process frameworks of POE

Designing building evaluation process is difficult and complicated as it may need some professional assumptions which a researcher may find difficult. This is because each professional area (Building, Estate and Facilities Management, Architecture, Quantity Survey) will tend to describe the framework from their field of study. Irrespective of professional background, building evaluation process framework can be adjusted and be applied by professionals in building profession. Professionals need only to adjust it to their individual professional views and at the same time discards irrelevant information to their professional views. This justified the incorporation of several building evaluation process frameworks in this review, to enable development of comprehensive process framework that can solve the problems of this study.

PROBE exercise carried out by Building Use Studies (BUS) as discussed above adopted a CIBSE TM3 framework to evaluate performance of office buildings in UK (Figure 2.1). The project was divided in to ten (10) stages of varying activities and
expected results. It was further proposed that the study can take two months to collect data, with another one month for editing, review and publication. The PROBE framework was adapted herein with necessary adjustments derived from other frameworks in literature discusses herewith, to incorporate more stages, activities and outcomes as needed by the research objectives and scope. Stages in Figure 2.1 include agreement to undertake a probe study, Pre-visit questionnaire, analysis and draft report, BUS occupant survey and PROBE final reports.
Figure 2.1: POE Process by PROBE (Cohen et al., 2001)

**STAGE 1**
Initial contact by BSJ preliminary agreement to survey

**STAGE 2**
Contact by survey team, Review preliminary information, Issue pre-visit questionnaire, Initiate energy analysis

**STAGE 3**
First site visit, complete details of PVQ, Walk-round survey, check on-site records, confirm energy data availability, seek approval to occupants’ survey, pressure test, metering, etc.

**STAGE 4**
Initial analysis, Review all information, Draft descriptive report, Do preliminary calculations, Identify outstanding items, Checklist for second visit

**STAGE 5**
Second site visit, Confirm messages and details

**STAGE 6**
BUS Occupant survey, Questionnaire and interviews

**STAGE 7**
EARM TM energy analysis plus benchmark comparison

**STAGE 8**
Pressure test by BRE or BSRIA

**STAGE 9**
Probe final report, Analysis and key messages

**STAGE 10**
Article for publication including BSJ graphics, Probe team final comments

COMMENTS FROM DESIGN TEAM
Reference data on achieved performance for benchmarking etc

COMMENTS FROM BUILDING OCCUPIER
Published article in CIBSE Journal

Improved industry practice and building performance

Agenda items for clients, occupiers, professionals, research and government

Additional information, requested from occupiers, contractors and utilities
However, a development process evaluation framework by Kim et al. (2005) in Figure 2.2 provided additional important stages to previous frameworks. It first stressed the need for literature review to identify and analyse an existing evaluation frameworks and documents which is very important for a comprehensive model development. It further stressed the need for setting evaluation criteria and model to enable comparism with previous studies as well as justifying the importance of the models used.

![Figure 2.2: Development process of evaluation framework (Kim et al., 2005)](image-url)
Nawawi & Khalil (2008) also proposed a POE process framework which comprises of concept, process and phases of evaluation. The framework (Figure 2.3) has three (3) phases of evaluation describing levels of the evaluation. Six (6) steps of systematic sequences which explain activities needed at each of three (3) phases were forwarded. Descriptive summary of the actions and issues to consider at each step was summarised under the steps. As an academic empirical study, there was need for this study also to adopt phasing of the study into three; activity, process and output as used by Nawawi & Khalil (2008) with different titles of initial phase, process phase and recommendation phase.

<table>
<thead>
<tr>
<th>INITIAL PHASE</th>
<th>PROCESS PHASE</th>
<th>RECOMMENDATION PHASE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STEP 1: BUILDING</strong></td>
<td><strong>STEP 3: PLANNING</strong></td>
<td><strong>STEP 5: APPLYING</strong></td>
</tr>
<tr>
<td><strong>STEP 2: OBJECTIVE</strong></td>
<td><strong>STEP 4: CONDUCTING</strong></td>
<td><strong>STEP 6: ACTION</strong></td>
</tr>
</tbody>
</table>

**Description:** Identify the information background of the buildings and define provided area function

**Issues to Consider:**
- Type of Building
- Total Area (if any)
- Location
- Year of Built

**Description:** Identify the need for the evaluation and probable aspects of the evaluation

**Issues to consider:**
- Objectives of evaluation and priorities
- Level of effort
- Team or number of personnel
- Instrument for evaluation
- Determine any benchmark used against other buildings

**Description:** Select planning approaches that will meet the needs of evaluation

**Issues to consider:**
- Decide when the work will be carried out
- Feasibility study
- Plan research
- Study building
- Visual inspection
- analyze performance of building
- Determine strength and weakness of building
- Toolkit: Performance Observation Evaluation

**Description:** Carry out the POE

**Issues to consider:**
- Define occupants/building user
- Collect data upon user
- Develop data collection
- Toolkit: occupant survey questionnaire
- Distribute and collect survey questionnaires, carry out interviews, meetings and observations
- Analyze data collection

**Description:** Applying feedback of findings

**Issues to consider:**
- Review outcomes
- Compile records and analysis
- Documentation, report, summary seek
- Recommendation plan for action

**Description:** Action in response to POE

**Issues to consider:**
- Now: within 3 months to a year
- Later: within 1 to 5 years
- Future: for future building
- Focus study: for management decision

Figure 2.3: Post occupancy evaluation phases (Nawawi & Khalil, 2008)
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