

**EVALUATION OF NIGERIAN PUBLIC HOUSING PERFORMANCE USING
OCCUPANTS' EXPERIENCE AND SATISFACTION**

BALA ISHIYAKU

**A thesis submitted in
fulfilment of the requirement for the award of the
Doctor of Philosophy in Real Estate and Facilities Management**

**Faculty of Technology Management and Business
Universiti Tun Hussein Onn Malaysia**

AUGUST, 2016

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.

ACKNOWLEDGEMENT

Innal'handu lillah, nah muduhu, wa nasta'inuhu, wa nastagfiruhu. I give thanks and praises to Almighty Allah for His mercy and grace for every aspect of my schooling, whom despite all obstacle and my shortcomings as human made me a vector in all my undertakings. PhD study is an enormous task which requires determination, patience and encouragement. I could not have accomplished this task without the able support of others. I wish to express my immense and profound gratitude my greatest indebtedness and deep appreciation to my supervisor Professor Madya Dr. Rozilah Kasim for her vital suggestions and criticism at various stages of this work, up to its logical conclusion. It was her guidance and direction that made this thesis a reality. I thank her most sincerely for the patience and understanding in taking time out of her tight schedules to make necessary corrections and suggestions.

My special appreciation goes to Dr. Adamu Isa Harir for his productive critical arguments that pave the ways to the ideas used in this study. My heart-felt thanks goes to Dr. Azlina Md Yassin and Dr. Muhammad Lizam Bin Muhammad Diah for their constructive criticism during my proposal defence, which significantly improved the arguments in this thesis. I want to acknowledge the contribution given to this study by BUS methodology Ltd UK, especially Adrian Leaman for granting me a licence to use BUS Methodology Domestic version Standard 2014 questionnaire in this study. I wish to appreciate the respond of Prof Dr. Zainuldeen Awang in respect to the moderation used in this study. Thank you very much for your simplicity and indiscriminate encouragement to students, we see you as a mentor sir.

I equally wish to acknowledge the unequal contribution of the Staff of Gombe State Property and Investment Corporation, especially Mr Sanusi Mohammad for assisting in the questionnaire administration. My special thanks go to the research assistants especially Mohammad Baba Isa for his logistic contributions. This piece would have suffered a great deal of dent without the contributions of Dr. Aliyu Ahmad Aliyu and his elder brother Dr. Abubakar Ahmad Aliyu. Thank you.

I am greatly indebted to my parent Mallam Ishiyaku Adamu and Malama Halimat Sadiya, my beloved wives Madam Hauwa Hassan and Anty Sakina Yunusa, and my children Abdullahi, Abdurrahman, Ibrahim Khalil, Mohammad Habeeb, Aseeya and Imran, my brothers Ahmad Ishiyaku and Lukman Ishaq and Sisters Fatima, Karimatu, Suwaiba and Rahila for their moral, financial and spiritual encouragement unequal patience with my absence during the course of this study, may Allah bless your sacrifices.

I want to acknowledge the support of the management of Abubakar Tafawa Balewa University (ATBU) Bauchi and TETFUND Nigeria especially Mr Auwal Ibrahim for both financial and moral support given to me. Others equally indebted to me are my colleagues like Dr. Isa Yuguda Kotirde, Dr. Yoosuf Yaro, Dr. Abdulazeez Raji and the host of others too numerous to mention for reason of space, thank you all for everything you shared with me.

Finally, I thank Almighty Allah, the Lord of heaven, the Creator and Inheritor of the Universe and beyond, for His abundant grace and special favour He granted me to write this all-important piece. Ultimately, whatever good is derived from this piece, all praise is due to Him but any error contained therein is my own and are highly regretted.

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

Terdapat salah faham di antara kepuasan dan pengalaman dalam membina penilaian prestasi atas beberapa faktor antaranya kekurangan kajian yang mendalam pada setiap satu, yang menyebabkan kekurangan fakta tentang struktur mereka dan pembolehubah penentu kesan daripada sifat-sifat sosial ekonomi dan syarat-syarat yang mereka disambungkan penghuni. Objektif kajian ini adalah untuk mengenal pasti tahap prestasi bangunan dan perbezaan antara penghuni kepuasan dan pengalaman, kesan ciri-ciri sosio-ekonomi ke atas mereka dan mencadangkan satu rangka kerja untuk menilai prestasi perumahan awam menggunakan penghuni 'kepuasan dan pengalaman. Metodologi soal selidik oleh Bangunan Penggunaan Pengajian (BUS), UK telah disesuaikan dan digunakan pada perjanjian lesen. Persampelan rawak sistematik telah digunakan untuk mengumpul data daripada 300 penghuni daripada empat (4) kawasan perumahan awam di *Gombe metropolitan Nigeria*. Dua faktor bebas daripada ciri-ciri bangunan ketara dan tidak ketara dan komponen bangunan bergantung telah diamalkan. analisis faktor penerokaan (EFA) telah digunakan dalam kajian perintis untuk mengenal pasti faktor pembolehubah. Analisis faktor pengesahan (CFA) dalam perisian AMOS telah digunakan untuk mengesahkan konstruk dan membangunkan dua model persamaan struktur (SEM) berdasarkan penghuni kepuasan dan pengalaman. Model-model yang telah tertakluk kepada pelbagai kaedah kesederhanaan CFA untuk *moderation* kesan ciri-ciri sosioekonomi penghuni. Keputusan menunjukkan perbezaan dalam prestasi ciri-ciri berdasarkan kepuasan dan pengalaman penghuni. Keputusan kesederhanaan SEM *moderation* bahawa kepuasan pendidikan dan pendapatan penghuni sederhana, sedang mereka bukan penghuni berpendapatan sederhana. Oleh itu, kajian ini juga memberi penekanan kepada kepentingan pengalaman penghuni sebagai langkah objektif membentuk prestasi terhadap subjektiviti kepuasan penghuni itu. Berdasarkan itu, rangka kerja untuk menilai prestasi perumahan awam menggunakan kepuasan dan pengalaman penghuni telah dicadangkan.

CONTENT

| | |
|----------------------------------|--------------|
| TITLE | i |
| EXAMINER'S DECLARATION | ii |
| DEDICATION | iii |
| ACKNOWLEDGEMENT | iv |
| ABSTRACT | v |
| ABSTRAK | vi |
| CONTENTS | vii |
| LIST OF TABLES | xiv |
| LIST OF FIGURES | xviii |
| LIST OF APPENDICES | xxi |
| | |
| CHAPTER 1 INTRODUCTION | 1 |
| 1.1 Introduction | 1 |
| 1.2 Problem Statement | 3 |
| 1.3 Research Questions | 6 |
| 1.4 Aim and Objectives | 6 |
| 1.5 Research hypotheses | 7 |
| 1.6 Scope of the Study | 7 |
| 1.7 Significance of the Study | 8 |
| 1.8 Research Structure | 9 |
| 1.9 Thesis Organisation | 9 |
| 1.10 Summary | 10 |

| | |
|---|-----------|
| CHAPTER 2 LITERATURE REVIEW | 11 |
| 2.1 Introduction | 11 |
| 2.2 Public Housing | 12 |
| 2.3 Public Housing Efforts in Nigeria | 13 |
| 2.4 Post Occupancy Evaluation (POE) | 17 |
| 2.4.1 Types of POE | 19 |
| 2.4.2 Review of existing process frameworks of POE | 20 |
| 2.4.3 POE benefits | 26 |
| 2.4.4 Summary of relevant previous studies on POE | 28 |
| 2.5 Concepts of Performance, Satisfaction and Experience | 30 |
| 2.5.1 Building performance | 30 |
| 2.5.2 Occupants' Satisfaction | 31 |
| 2.5.3 Occupants' experience | 32 |
| 2.5.4 Factors affecting occupants' satisfaction and experience | 35 |
| 2.6 Socio-economic attributes in performance evaluation | 36 |
| 2.7 Performance and satisfaction of building features | 37 |
| 2.7.1 Relation of performance and satisfaction | 41 |
| 2.8 Building performance evaluation using occupants' experience | 41 |
| 2.9 Building performance evaluation methods | 44 |
| 2.9.1 Building Use Studies (BUS) occupant survey | 44 |
| 2.9.2 Soft landing | 45 |
| 2.9.3 PROBE method | 45 |
| 2.9.4 Construction Industry Council Design Quality Indicator | 46 |
| 2.9.5 Overall Liking Score | 46 |
| 2.9.6 Building Quality Assessment (BQA) | 47 |
| 2.9.7 Standard of House Performance Appraisal (SHPA) | 47 |
| 2.10 Performance evaluation strategies, techniques and analysis | 48 |
| 2.10.1 Issues in public housing performance evaluation | 52 |
| 2.11 Theoretical framework development for the study | 53 |
| 2.11.1 Theories of performance, satisfaction and experience | 55 |

| | | |
|--------|---|----|
| 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 |

| | | |
|--|---|------------|
| 3.8.2 | Exploratory factor analysis (EFA) | 105 |
| 3.8.3 | Confirmatory Factor Analysis (CFA) | 108 |
| 3.8.4 | Reliability of data collection | 110 |
| 3.8.5 | Validation of data collection | 110 |
| 3.8.6 | Structural equation modelling (SEM) method | 112 |
| 3.8.7 | Moderation method in model simulation | 115 |
| 3.9 | Summary | 117 |
| CHAPTER 4 DATA ANALYSIS AND RESULTS | | 118 |
| 4.1 | Introduction | 118 |
| 4.2 | Field survey questionnaire administration | 118 |
| 4.3 | Data screening | 119 |
| 4.4 | Assessment of normality and descriptive analyses | 120 |
| 4.5 | Socio-economic attributes of occupants | 122 |
| 4.6 | Building performance evaluations | 125 |
| 4.6.1 | Criteria for performance ranking | 125 |
| 4.6.2 | Performance of building components, intangible and tangible features | 126 |
| 4.7 | Paired t-test analysis | 135 |
| 4.7.1 | Paired t-test results for occupants' satisfaction and Experience | 136 |
| 4.8 | Summary | 142 |
| CHAPTER 5 STRUCTURAL EQUATION MODELLING | | 143 |
| 5.1 | Introduction | 143 |
| 5.2 | SEM satisfaction and experience models | 143 |
| 5.2.1 | Reliability tests of constructs | 144 |
| 5.2.2 | PCA results for building satisfaction constructs | 145 |
| 5.2.3 | PCA results for building satisfaction constructs | 146 |
| 5.2.4 | Confirmatory factor analysis (CFA) results | 147 |

| | | |
|--|---|------------|
| 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 | 234 |
| List of publications and awards | 235 |

LIST OF TABLES

| | | |
|-----|---|-----|
| 2.1 | Reasons for public housing developments | 12 |
| 2.2 | Types of post occupancy evaluation | 20 |
| 2.3 | Benefits of POE | 27 |
| 2.4 | Factors affecting occupants satisfaction and experience | 35 |
| 2.5 | Summary of research framework to evaluate public housing performance using satisfaction and experience | 76 |
| 3.1 | Available facilities | 96 |
| 3.2 | Descriptive and normality test of building experience constructs Pilot Survey (n=102) | 97 |
| 3.3 | Descriptive and normality test of building satisfaction constructs pilot survey (n=102) | 98 |
| 3.4 | Exploratory factor analysis for pilot study | 100 |
| 3.5 | Reliability of pilot results | 101 |
| 3.6 | Index category and levels of acceptance | 109 |
| 3.7 | Organisation of datasets and models for moderation analysis | 115 |
| 4.1 | Questionnaire administration | 119 |
| 4.2 | Descriptive and normality test of building satisfaction constructs | 121 |

| | | |
|------|--|-----|
| 4.3 | Descriptive and normality test of occupants' experience constructs | 122 |
| 4.4 | Profile of housing occupants | 124 |
| 4.5 | Seven (7) Likert scale criteria for building performance ranking | 125 |
| 4.6 | Summary of research objective 1 presentation | 127 |
| 4.7 | T-test result for building components | 136 |
| 4.8 | T-test result for intangible features | 138 |
| 4.9 | T-test result for tangible features | 139 |
| 4.10 | T-test result for building components, tangible and intangible features as a whole | 141 |
| 5.1 | Cronbach's alpha | 144 |
| 5.2 | PCA results for building satisfaction constructs | 145 |
| 5.3 | PCA results for all constructs | 146 |
| 5.4 | Reliability and validity of building satisfaction measurement models | 152 |
| 5.5 | Reliability and validity of building experience measurement models | 156 |
| 5.6 | Parameter estimates for final structural model of occupants' satisfaction | 159 |
| 5.7 | Parameter estimates for final structural model of occupants' experience | 162 |
| 5.8 | Moderation test for high education in satisfaction model | 163 |
| 5.9 | Moderation test for low education in satisfaction model | 164 |
| 5.10 | Moderation test for education in satisfaction model | 165 |

| | | |
|------|--|-----|
| 5.11 | Moderation test for high education in experience model | 166 |
| 5.12 | Moderation test for low education in experience model | 167 |
| 5.13 | Moderation test for education in experience model | 167 |
| 5.14 | Moderation test for high income in satisfaction model | 169 |
| 5.15 | Moderation test for low income in satisfaction model | 169 |
| 5.16 | Moderation test for income in satisfaction model | 170 |
| 5.17 | Moderation test for high income in experience model | 171 |
| 5.18 | Moderation test for low income in experience model | 172 |
| 5.19 | Moderation test for income in experience model | 173 |
| 5.20 | Standardized regression weights and significance in satisfaction model | 173 |
| 5.21 | Standardized regression weights and significance in experience model | 174 |

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 | 73 |
| 2.16 | Research framework to evaluate public housing performance using occupants' satisfaction and experience | 77 |
| 3.1 | Research paradigm flow chat | 80 |
| 3.2 | Philosophical assumptions verses schools of thought | 86 |
| 3.3 | Process framework of study | 90 |
| 3.4 | Research analysis plan | 103 |
| 4.1 | Building components' performance and satisfaction | 128 |
| 4.2 | Intangible features performance and satisfaction | 130 |
| 4.3 | Tangible features performance and satisfaction | 132 |
| 4.4 | Building performance and satisfaction | 133 |
| 5.1 | First iteration for BSC measurement model | 148 |
| 5.2 | Second iteration for BSC measurement model | 148 |
| 5.3 | Third iteration for BSC measurement model | 149 |
| 5.4 | First iteration for IBSC measurement model | 149 |
| 5.5 | Second iteration for IBSC measurement model | 150 |
| 5.6 | First iteration for TBSC measurement model | 150 |
| 5.7 | Second iteration for TBSC measurement model | 151 |
| 5.8 | First iteration for BEC measurement model | 153 |
| 5.9 | Second iteration for BEC measurement model | 153 |

| | | |
|------|---|-----|
| 5.10 | CFA for IBEC measurement model | 154 |
| 5.11 | First iteration for TBEC measurement model | 154 |
| 5.12 | Revised iteration for TBEC measurement model | 155 |
| 5.13 | First occupants' satisfaction structural model | 157 |
| 5.14 | Revised occupants' satisfaction structural model | 158 |
| 5.15 | First occupants' experience structural model | 159 |
| 5.16 | Second occupants' experience structural model | 160 |
| 5.17 | Revised occupants' experience structural model | 161 |
| 6.1 | A proposed POE framework to evaluate public housing performance using occupants' satisfaction and experience | 177 |

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.,

2011). 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 intension (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

| S/N | | Reasons | Source |
|-----|-----------------------------|---|---|
| 1 | Redistribution of resources | 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 | (Balchin <i>et al.</i> , 1995) (Badejo, 2005) |
| 2 | Standard control | 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 | Sheppard (2011); Elgin (2010); Lee & Chan (2010); Balchin <i>et al.</i> (1995) |
| | | Public service of providing sufficient housing of suitable standard directly, at an affordable and controlled cost and quality to residents | Balchin <i>et al.</i> (1995) |
| 3 | Public service delivery | 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 | Badejo (2005) |
| | | Help housing policy design in terms of Institutional development and assistance, budgetary support for housing and user satisfied houses | Badejo (2005) |

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)

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

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.

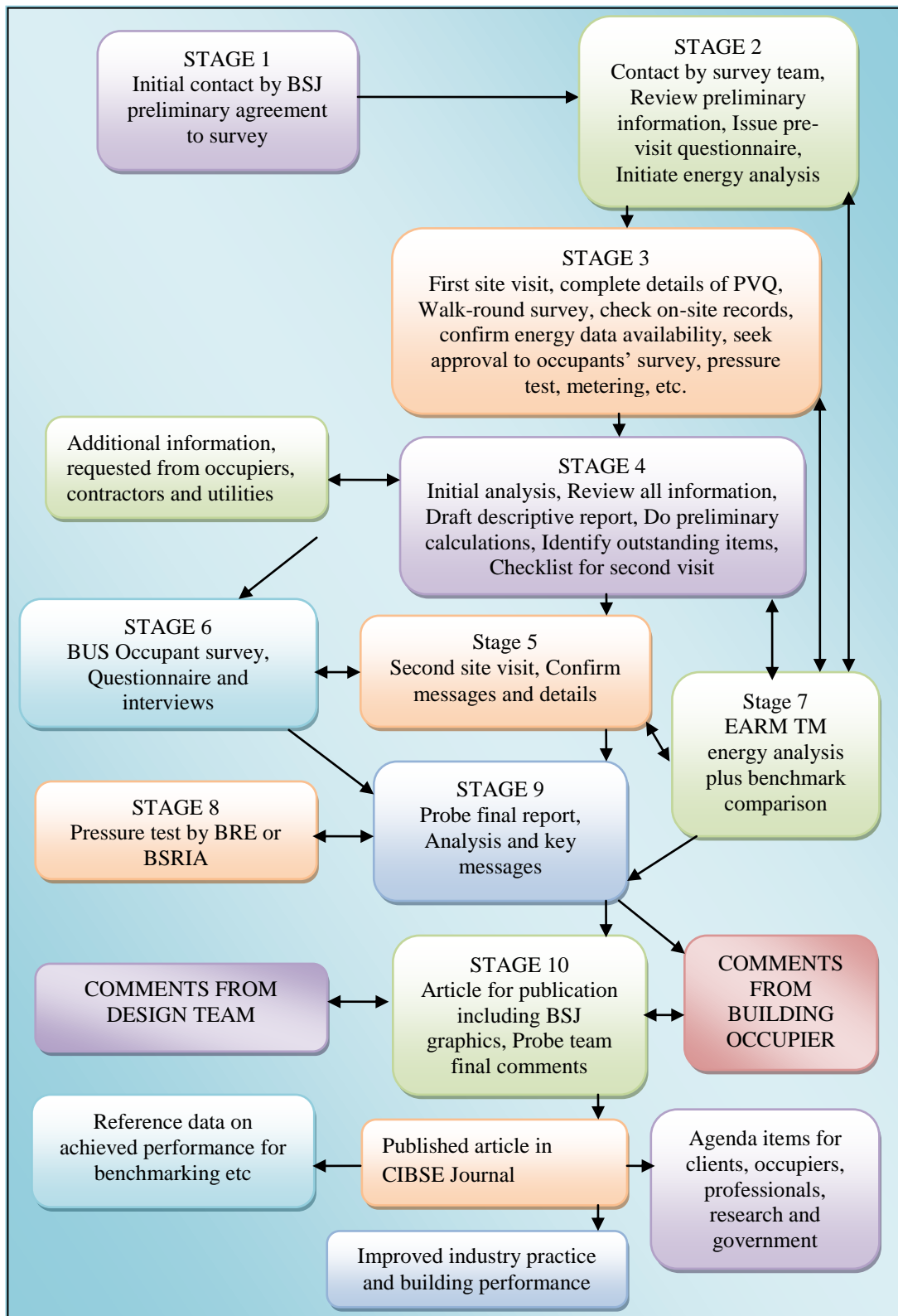


Figure 2.1: POE Process by PROBE (Cohen *et al.*, 2001)

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.

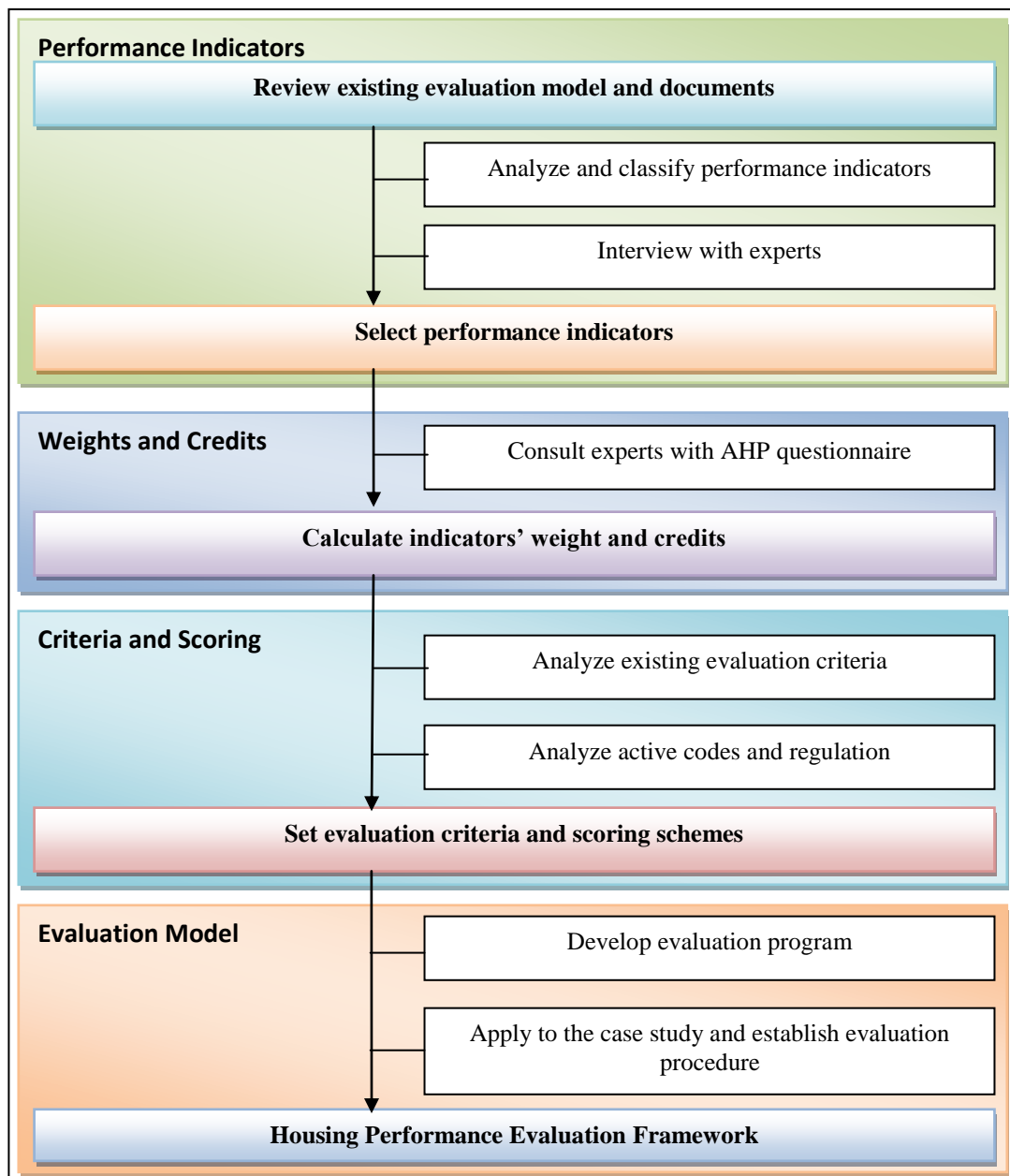


Figure 2.2: Development process of evaluation framework (Kim *et al.*, 2005)

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.

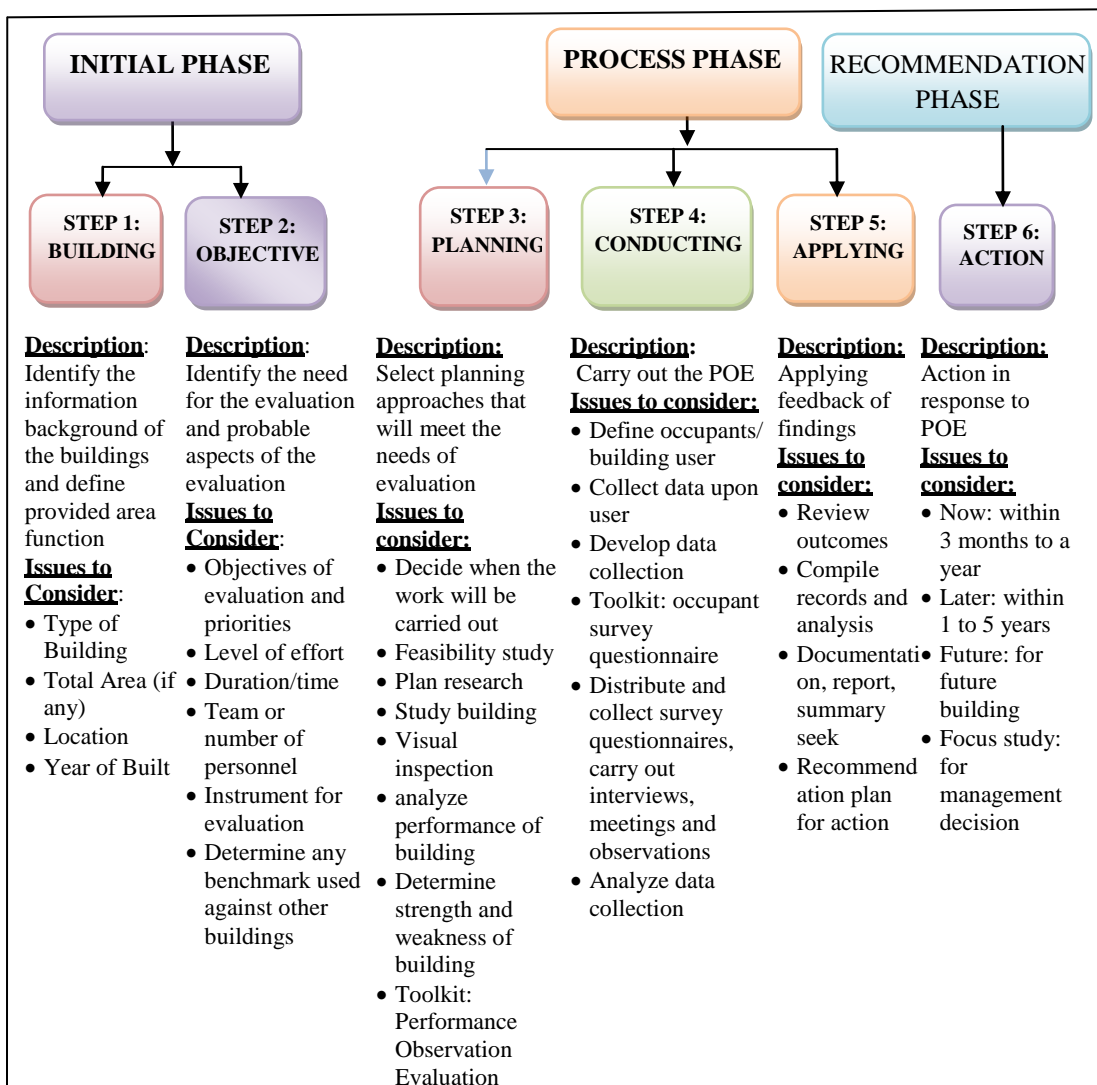


Figure 2.3: Post occupancy evaluation phases (Nawawi & Khalil, 2008)

REFERENCES

- Abdul Ghani, S. (2008). Neighbourhood factors in private low cost housing in Malaysia. *Habitat International* (32), 485-493.
- Adams, J. S. (1963). Toward an understanding of inequity. *Journal of Abnormal Social Psychology*. (67), 422-36.
- Adejumo, A. A. (2008). Some thoughts on affordable and social housing in Nigeria. *Prototype buildings*. Available at <http://www.gamji.com/article8000/NEWS8369.htm>
- Afolabi, B. M., Clement, C. O., Ekundayo, A., & Dolapo, D. (2012). A hospital-based estimate of major causes of death among under-five children from a health facility in Lagos, Southwest Nigeria: possible indicators of health inequality. *International Journal of Equity Health*, 11, 39.
- Aigbarboa, C. O. & Thwala, W. D. (2013). Confirmatory factorial validity of neighbourhood features amongst South Africa low-income housing occupants, *Journal of Economics and Behavioural Studies*, 5 (12), 825-837.
- Ajanlekoko, J.S. (2001). Sustainable Housing Development in Nigeria: The Financial and Infrastructural Implication. Nairobi, Kenya. *International Conference on Spatial Information for Sustainable Development*. 2–5 October, 2001.
- Akewusola, W. A. (2006). Solving housing problems in a developing economy: case study of Nigeria Housing Policies. Paper Presented at the 5th International Conference on Housing; Shelter Africa 2006: Organized by Association of Housing Corporations of Nigeria: March 13-17 2006.
- Akoka, J. (1999). Conceptual design of parallel systems. In *Conceptual Modeling* (pp. 1-23). Berlin Heidelberg; Springer.
- Akomolede, K. (2003). Assessing Private Sector Participation in Housing Delivery in Nigeria. Paper Presented at One Day CPD Workshop. The Ogun State Branch of the Nigerian Institute F Estate Surveyors and Valuers. October 28, 2003.
- Alben, L. (1996). Quality of experience: defining the criteria for effective interaction design. *Interactions*, 3, 11 – 15.

- Alexander, K. (2006). The application of usability concepts in the built environment, *Journal of Facilities Management*, 4 (4), 262 - 270
- Allam, A. H., Hussin, A. C. & Dahlan, H. M. (2013). User Experience: Challenges and Opportunities. *Journal of Information Systems Research and Innovation*, 3, 28-36.
- Allee, V. (2008). Value network analysis and value conversion of tangible and intangible assets, *Journal of Intellectual Capital*, 9 (1), 5-24.
- Alsaqre, O. Z. E. (2011). Investigating the effects of tangible and intangible factors on customers' perceived service quality and loyalty in hotel industry in Al-Ladhiqiyah, Syria", a master degree thesis submitted to School of Housing, Planning and Building, Universiti Sains Malaysia, Penang, Malaysia.
- ALwaer, H., & Clements-Croome, D. J. (2010). Key performance indicators (KPIs) and priority setting in using the multi-attribute approach for assessing sustainable intelligent buildings. *Building and Environment*, 45(4), 799–807.
- Amaratunga, D. & Baldry, D., (2002). Performance measurement in facilities management organisations: transition from measurement to management, *Proceeding of the CIB W070 Global symposium*, Glasgow (UK).
- Amin, M., & Isa, Z. (2008). An examination of the relationship between service quality perception and customer satisfaction: A SEM approach towards Malaysian Islamic banking. *International Journal of Islamic and Middle Eastern Finance and Management*, 1(3), 191-209.
- Amole, D. (2009). Residential satisfaction in students' housing. *Journal of Environmental Psychology*, 29(1), 76-85.
- Anderson, J. C. & Gerbing, D. W. (1988). Structural equation modelling in practice: A review and recommended two-step approach, *Psychological Bulletin*, 103 (1) 411-423.
- Anderson, R. E. (1973). Consumer dissatisfaction: The effect of disconfirmed expectancy on perceived product performance. *Journal of marketing research*, 10 (7) 38-44.
- Apparicio, P. & Seguin, A. (2006). Measuring the accessibility of services and facilities for residents of public housing in Montreal", *Urban Studies*, 43 (1), 187-211.
- Arhippainen, L. & Tähti, M. (2003). Empirical evaluation of user experience in two adaptive mobile application prototypes. In: *Proceedings of the 2nd International Conference on Mobile and Ubiquitous Multimedia (MUM 2003)*, 27-34.
- Awang, Z. (2014). *A Handbook on Structural Equation Modeling for Academicians and Practitioners*, MPWS rich resources, Bandar baru bangi, kuala lampur, Malaysia.

- Badejo, F. (2005). Theoretical Premises: Housing Corporations in a Privatising Africa. In Kimani, M. W. & Okonkwo O. (Eds), Proceedings of Shelter-Afrique Annual Symposia 1991-2004, pp. 103-111(Nairobi, Kenya, Shelter-Afrique Publications).
- Bagozzi, R. P., & Yi, Y. (1989). On the use of structural equation models in experimental designs. *Journal of Marketing Research*, 271-284.
- Baird, G. (1996). *Building evaluation techniques*. New Zealand: McGraw-Hill Professional Publishing.
- Baird, G. & Jackson, Q. (2004). Probe-style questionnaire surveys of building users – an international comparison of their application to large-scale passive and mixed-mode teaching and research facilities’, in Proceedings of SBSE Conference Closing The Loop: Post Occupancy Evaluation: The Next Steps, Windsor, UK, Society of Building Science Educators, 29 April–2 May, CD-Rom
- Balchin, P.N., Bull, G.H. & Kiev, J.L. (1995). *Urban Land Economics and Policy* (5th Edition). London, U.K: Palgrave.
- Bartlett, J. E., Kotrlik, J. W. & Higgins, C. C. (2001). Organizational research: determining appropriate sample size in survey research, *Information Technology, Learning, and Performance Journal*, 19(1), 43-50.
- Bentler, P. M., & Kano, Y. (1990). On the Equivalence of Factors and Components. *Multivariate Behavioral Research*, 25 (1), 67-74.
- Best, R., Langston, C. A., & De Valence, G. (Eds.). (2003). *Workplace strategies and facilities management*. Routledge.
- Blyth, A., Gilby, A. & Barlex, M. (2006). Guide to post occupancy evaluation. Higher Education Funding Council for England (HEFCE). Retrieved March, 22, 2013.
- Bollen, K. A. (1989). *Structural Equations with Latent Variables*, John Wiley & Sons, Inc., New York.
- Bordass, B., & Leaman, A. (2005a). Making feedback and post-occupancy evaluation routine 1: A portfolio of feedback techniques. *Building Research & Information*, 33(4), 347–352. doi:10.1080/09613210500162016
- Bordass, B., & Leaman, A. (2005b). Making feedback and post-occupancy evaluation routine 3: Case studies of the use of techniques in the feedback portfolio. *Building Research & Information*, 33(4), 361–375. doi:10.1080/09613210500162032
- Bordass, B., Leaman, A., & Ruyssevelt, P. (2001). Assessing building performance in use 5: conclusions and implications. *Building Research & Information*, 29(2), 144–157. doi:10.1080/09613210010008054
- Bordass, W., Leaman, A., & Eley, J. (2006). A Guide to Feedback and Post Occupancy Evaluation. *Usable Buildings Trust*.

- Braunsberger, K. & Gates, R. (2009). Developing inventories for satisfaction and Likert scales in a service environment. *Journal of Services Marketing*, 23(4), 219-225.
- Brayfield, A. H. & Crockett, W. H. (1955). Employee Attitudes and Employee Performance, *Psychological Bulletin*, LII396-424.
- Brown, Z., Cole, R. J., Robinson, J., & Dowlatabadi, H. (2010). Evaluating user experience in green buildings in relation to workplace culture and context, *Facilities*, Vol. 28 No. 3/4, pp. 225-238. doi:10.1108/02632771011023168.
- Browne, M. W. & Cudek, R. (1993). Alternative ways of assessing models fit”, in Bollen, K. A. & Long, J. S. (Eds.), *Testing Structural Equation Models*. Sage, Newbury Park, CA.
- Bruin, M. J., & Cook, C. C. (1997). Understanding constraints and residential satisfaction among low-income single-parent families. *Environment and Behavior*, 23(5), 531–552.
- Burns, R. B. (2000). *Introduction to research methods*. London: Sage.
- Burrell, G., & Morgan, G. (1979). Sociological paradigms and organizational analysis. London: Heinemann.
- BUS (2011). The building use studies (BUS) occupant survey: Origins and approach Q&A. Building Use Studies (Ed.).
- Busacca, B. & Padula, G. (2005). Understanding the relationship between attribute performance and overall satisfaction: Theory, measurement and implications. *Marketing Intelligence & Planning*, 23(6), 543-561.
- Byrne, B. M. (1995). One application of structural equation modeling from two perspectives: Exploring the EQS and LISREL strategies”, in Lee, T. P. (2010), Role conflict as mediator of the relationship between total quality management practices and role ambiguity. A PhD thesis submitted to Faculty of Management, Multimedia University Malaysia.
- Byrne, B. M. (1998). *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming*. Mahwah, NJ: Erlbaum.
- Byrne, B. M. (2010). *Structural equation modeling with AMOS*, (2nd ed.). New York: Routledge.
- Byrne, D. (2002). *Interpreting quantitative data*. Sage.
- Cadotte, E. R., Woodruff, R. B., & Jenkins, R. L. (1987). Expectations and norms in models of consumer satisfaction”, *Journal of marketing Research*, 305-314.
- Cameron, K. & Whetten, D. (1983). *Organizational Effectiveness: One Model or Several? Organizational Effectiveness – A Comparison of Multiple Models*. CA, Academic Press.

- Cardozo, R. N. (1965). An experimental study of customer effort, expectation, and satisfaction. *Journal of marketing research*, 2, 244-249.
- Carey, S. (2000). *The origin of concepts*. New York: Oxford University Press.
- Carnap, R. (1950). Empiricism, Semantics, and Ontology. Included as Supplement A in Rudolf Carnap, *Meaning and Necessity. A Study in Semantics and Modal Logic*. Enlarged Edition. Chicago, London: Chicago UP. The essay originally appeared in *Revue Internationale de Philosophie* 4, 1950: 20-40.
- Cassell, C. & Symon, G. (1994). *Qualitative Methods in Organizational Research*. London: Sage.
- Chenery, M., Faith, R. & Ruth, V. (1987). Responsive Evaluation: An Application of Naturalistic Inquiry to Recreation Evaluation. *Evaluation*, 5 (4) 30-38.
- Child, D. (2006). *The essentials of factor analysis*. (3rd ed.). New York, NY: Continuum International Publishing Group.
- Choi, J. K. (2013). Psychological process of loyalty formation towards professional sport brands: the differences and similarities between domestic and overseas customers. PhD Thesis, University of Warwick).
- Churchill Jr, G. A., & Surprenant, C. (1982). An investigation into the determinants of customer satisfaction. *Journal of marketing research*, 491-504.
- Cilliers, P. (1998). *Complexity and Postmodernism: Understanding Complex Systems*. London: Routledge.
- Clift, M. (1996). Building quality assessment (BQA) for offices. *Structural Survey*, 14(2), p.22-25
- Coakes, S. J. (2006). SPSS: Analysis without anguish: Version 14.0 for Windows, Milton, Qld: John Wiley & Sons, in Shammout, A. B., (2007) Evaluating an extended relationship marketing model for Arab guests of five-star hotels. PhD thesis, Victoria University, Melbourne, Australia.
- Cohen, R., Standeven, M., Bordass, B., & Leaman, A. (2001). Assessing building performance in use 1: the Probe process. *Building Research & Information*, 29(2), 85-102.
- Cole, R. J., & Brown, Z. (2009). Reconciling human and automated intelligence in the provision of occupant comfort. *Intelligent Buildings International*, 1(1), 39-55.
- Cole-Colander, C. (2003). Designing the customer experience. *Building Research & Information*, 31(5), 357-366.
- Corbetta, P. (2003). *Social research: Theory, methods and techniques*. London: Sage.
- Costello, A. B. & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis.

- Practical Assessment, Research & Evaluation*, 10 (7). Available online: <http://pareonline.net/pdf/v10n7.pdf>.
- Cox, E. P. III. (1980). The optimal number of response alternatives for a scale: A review. *Journal of Marketing Research*, 17(4), 407-422.
- Cozens, P., Hillier, D., & Prescott, G. (2001). Crime and the design of residential property—exploring the perceptions of planning professionals, burglars and other users: Part 2, *Property Management*, 19 (4), 222 – 248.
- Creek, J. (2003). *Occupational therapy defined as a complex intervention*. London: College of Occupational Therapists.
- Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications, Incorporated.
- Creswell, J. W. (2003). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. (2nd Ed.). London, Sage Publications.
- Crotty, M. (2001). *The foundations of social science research*. Thousand Oaks, CA: Sage.
- Curtis, M. A., Corman, H., Noonan, K., & Reichman, N. E. (2010). Effects of child health on housing in the urban US. *Social Science & Medicine*, 71(12), 2049-2056.
- Cutler, B., Sheng, Y., Martin, S., Glaser, D., & Andersen, M. (2008). Interactive selection of optimal fenestration materials for schematic architectural daylighting design. *Automation in Construction*, 17(7), 809-823.
- Dawes, J. G. (2008). Do data characteristics change according to the number of scale points used? An experiment using 5 point, 7 point and 10 point scales, *International journal of market research*, 51 (1).
- Dawis, R. V., England, G. E. & Lofquist, L. H. (1968). *A Theory of Work Adjustment: A Revision*. Minneapolis: University of Minnesota, Industrial Relations Center.
- De Carvalho, J., & Chima, F. O. (2014). Applications of structural equation modeling in social sciences research. *American International Journal of Contemporary Research*, 4(1), 6-11.
- DeCoster, J. (1998). Overview of factor analysis. Retrieved March 22, 2012 from <http://www.stat-help.com/notes.html>.
- Deegan, J. (1978). On the occurrence of standardized regression coefficients greater than one. *Educational and Psychological Measurement*, 38(4), 873-888.
- Denzin, N. K., & Lincoln, Y. S. (1994). *Handbook of qualitative research*. Newbury Park, CA: Sage Publications, Inc.
- Deuble, M. P., & De Dear, R. J. (2012). Green occupants for green buildings: The missing link? *Building and Environment*, 56, 21–27. doi:10.1016/j.buildenv.2012.02.029

- Dickoff, J. & James, P. (1968). A theory of theories: a position paper.' *Nursing Research* 17 (3), 197–203.
- Dickoff, J., James, P. & Wiedenbach, E. (1968). Theory in a practice discipline: Part 1. Practice oriented theory. *Nursing Research* 17 (5), 415–435.
- Djebarni, R., & Al-Abed, A. (2000). Satisfaction Level with Neighbourhoods in Low-Income Public Housing in Yemen, *Property Management*, 18 (4), 230 – 242.
- Doll, W. J., Xia, W., & Torkzadeh, G. (1994). A confirmatory factor analysis of the end-user computing satisfaction instrument. *Mis Quarterly*, 18 (4), 453-461.
- Donaldson, L. (1995). *American anti-management theories of organization: A critique of paradigm proliferation*. Cambridge: Cambridge University Press.
- Douglas, J. (1996). Building performance and its relevance to facilities management. *Facilities*, 14(3), 23 – 32.
- Douthwaite, B., Keatinge, J.D.H. & Park, J. (2002). Learning selection: an evolutionary model for understanding, implementing and evaluating participatory technology development, *Agricultural Systems*, 72, 109-31.
- Driscoll, D. L. (2011). Introduction to primary research: Observations, surveys, and interviews. *Writing Spaces: Readings on Writing*, 2, 153-174.
- Duque, L. C., & Lado, N. (2010). Cross-cultural comparisons of consumer satisfaction ratings: A perspective from Albert Hirschman's theory. *International Marketing Review*, 27(6), 676-693.
- Egan, J. (1998). *Rethinking construction*. Department of the Environment, Transport and Regions, London: HMSO. (<http://www.construction.detr.gov.uk/cis/rethink/>).
- Elgin, J. E. (2010). The Impact of Neighbourhood Characteristics and Support on Well-being, Housing Satisfaction, and Residential Stability for People with a Mental Illness. University of Canterbury: Master's Thesis.
- Elsinga, M. & Hoekstra, J. (2005). Homeownership and Housing Satisfaction. *Journal of Housing and the Built Environment*, 20, 401-424.
- Eni, C. M. A. (2015). Component Analysis of Design and Construction as Housing Acceptability Factor of Public Housing Estates in Anambra State, Nigeria. *Global Journal of Researches in Engineering*, 15(2).
- Erevelles, S. & Clark Leavitt (1992). A Comparison of Current Models of Consumer Satisfaction/Dissatisfaction. *Journal of Consumer Satisfaction, Dissatisfaction, and Complaining Behavior*. 5, 104-14.
- Erman, O. K. (2004). The analysis of symbolic performance in mass housing settlements. *Building and environment*, 39(4), 449-457.

- Fabrigar, L. R., Wegener, D.T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4 (3), 272-299.
- Fatoye, E. O. & Odusami, K. T. (2009). Occupants' satisfaction approach to housing performance evaluation: the case of Nigeria. In: *Proceedings of the RICS COBRA Research Conference*, University of CapeTown, 10–11September, 2009. Available from: [/http://www.rics.org/cobraS](http://www.rics.org/cobraS). (accessed15.04.13).
- Fernández-Solís, L.G., Pathak, R., Lavy, S., Beltrán, O.L., Son, K. & Kim, K. (2011). Framework for Selecting Performance Assessment Tools for Achieving LEED 3.0 Credits, *Architectural Engineering and Design Management*, 7 (4), 236-250.
- Ferris, K. R. (1981). Organizational commitment and performance in a professional accounting firm. *Accounting, Organizations and Society*, 6(4), 317-325.
- Field, A. (2009). *Discovering Statistics Using SPSS: Introducing Statistical Method* (3rd ed.). Thousand Oaks, CA: Sage Publications.
- Fisk, D. (2001). Sustainable development and post-occupancy evaluation, *Building Research & Information*, 29 (6), 466-8.
- Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*, 7 (3), 286-299.
- Flynn, B. B., Schroedar, R. G., Flynn, E. J., Sakakibara, S., & Bates, K. A. (1997). World-class manufacturing project: Overview and selected results, *International Journal of Operations & Production Management*, 17 (7), 671-685.
- Forlizzi, J. & Ford, S. (2000). Building blocks of experience: an early framework for interaction designers. In: *Proceedings of the Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques* (DIS 2000), 419-423.
- Fornell, C. (1992). A national customer satisfaction barometer: the Swedish experience. *Journal of Marketing*, 56 (1), 1-21.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error, *Journal of Marketing Research*, 18 (1), 39-50.
- Fornell, C., Johnson, M. D., Anderson, E. W., Cha, J. & Bryant, B. E. (1996). The American customer satisfaction index: nature, purpose, and findings. *The Journal of Marketing*, 7-18.
- Forza, C., & Filippini, R. (1998). TQM impact on quality conformance and customer satisfaction: A causal model, *International Journal of Production Economics*, 55 (1), 1-20.

- Fowler, F. J. (2008). *Survey Research Methods (Applied Social Research Methods)*. Sage Publications, Inc Page.
- Frege, G. (1997). *On Concept and Object*, trans. P. Geach, in M. Beaney (ed.) *The Frege Reader*, Oxford: Blackwell Publishers.
- Gann, D., Salter, A., & Whyte, J. (2003). Design quality indicator as a tool for thinking. *Building Research & Information*, 31(5), 318-333.
- Garson, G. D. (2008). Path analysis. *from Statnotes: Topics in multivariate analysis. Retrieved, 9(05), 2014*. Available at: < <http://www2.chass.ncsu.edu/garson/pa>, 765.
- Genjo, K. S. M. & Hasegawa, K. (2006). Questionnaire survey on indoor climate and energy consumption for residential buildings related with lifestyle in cold climate area of Japan', in E. de Oliveira Fernandes et al. (eds), *Healthy Buildings: Creating a Healthy Environment for People, Proceedings of Healthy Building 2006 International Conference*, Lisbon, 3, 355–360.
- George, D., & Mallery, M. (2010). *SPSS for Windows Step by Step: A Simple Guide and Reference, 17.0 update (10a ed.)* Boston: Pearson.
- Gerbing, D. W., & Anderson, J. C. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research*, 25, 186-192.
- Gioia, D., & Pitre, E. (1990). Multiparadigm perspectives on theory building. *Academy of Management Review*, 15(4), 584–602.
- Goertz, G. (2006). *Social science concepts: a user's guide*. Princeton University Press.
- Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The qualitative report*, 8(4), 597-606.
- Gopikrishnan, S., & Topkar, V. M. (2015). Attributes and descriptors for building performance evaluation. *HBRC Journal*.
- Gorsuch, R.L. (1983). *Factor analysis (2nd ed.)*. Hillside, NJ: Lawrence Erlbaum Associates.
- Green, A. & Ryan, J. C. H. (2005). A framework of intangible valuation areas (FIVA): Aligning business strategy and intangible assets, *Journal of Intellectual Capital*, 6 (1) 43-52.
- Greenspoon, P. J., & Saklofske, D. H. (1998). Confirmatory factor analysis of the multidimensional students' life satisfaction scale. *Personality and Individual Differences*, 25, 965-971.
- Grewal, R., Cote, J. A., & Baumgartner, H. (2004). Multicollinearity and measurement error in structural equation models: Implications for theory testing. *Marketing Science*, 23(4), 519-529.

- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research*, 2(163-194), 105.
- Guba, E. G. & Lincoln, Y. S. (1981). Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches. The Jossey-Bass higher and adult education series and the Jossey-Bass social and behavioral science series. San Francisco, CA, US: Jossey-Bass.
- Hair, J. F. Jr., Black, W. C., Babin, B. J. & Anderson, R. E. (2010). *Multivariate Data Analysis: A Global Perspective*, (7th ed.), Pearson Education Inc., New Jersey.
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate Data Analysis with Readings*, (4th ed.), Prentice Hall, Englewood Cliffs, NJ.
- Hamzah, M. B. (1997). *Housing policy in Malaysia: Conditions, perspectives and Islamic values*, University of Leeds, PhD Thesis.
- Hanson, G., Lloyd, R., & Lorimer, B. (2004). *Evaluation of the Social Housing Programme Yukon*, Yukon Housing Corporation, Canada.
- Harir, A. I., Kasim, R. and Ishiyaku, B. (2015). A theoretical framework for the analysis of residential solid wastes generation and composition (SWG) in Bauchi metropolis, Nigeria, *Applied Mechanics and Materials*, (773-774), 1389-1393.
- Harrison, A. W., & Rainer, R. K. (1996). A general measure of user computing satisfaction. *Computers in Human Behavior*, 12(1), 79-92.
- Hashim, A. E., Samikon, S. A., Nasir, N. M., & Ismail, N. (2012). Assessing Factors Influencing Performance of Malaysian Low-Cost Public Housing in Sustainable Environment. *Procedia - Social and Behavioral Sciences*, 50, 920–927.
- Hassanain, M. A. (2008). On the performance evaluation of sustainable student housing facilities. *Journal of Facilities Management*, 6(3), 212–225.
- Hassanain, M. A., Mohammed, M. A., & Cetin, M. (2012). A multi-phase systematic framework for performance appraisal of architectural design studio facilities. *Facilities*, 30(7/8), 324–342. doi:10.1108/02632771211220077
- Hassard, J., & Kelemen, M. (2002). Production and consumption in organizational knowledge: The case of the ‘paradigms debate’. *Organization*, 9(2), 331–355.
- Hassenzahl, M. & Roto, V. (2007). Being and Doing: a Perspective on User Experience and its Measurement. *Interfaces*. (72) 10-12
- Hassenzahl, M., & Tractinsky, N. (2006). User experience-a research agenda. *Behaviour and information technology*, 25(2), 91-97.

- Hayes, A. F. (2012). Process: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Retrieved from <http://www.afhayes.com/public/process2012.pdf>.
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.
- Hebb, D. (1949). *Organization of Behavior*, New York: Wiley
- Hebert, P. R., & Chaney, S. (2012). Using end-user surveys to enhance facilities design and management. *Facilities*, 30(11/12), 458-471.
- Hendrickson, D. J., Lindberg, C., Connelly, S., & Roseland, M. (2011). Pushing the envelope: market mechanisms for sustainable community development. *Journal of Urbanism: International Research on Place making and Urban Sustainability*, 4(2), 153–173. doi:10.1080/17549175.2011.596263
- Henseler, J., Ringle, C.M. & Sinkovics, R.R. (2009). The use of partial least squares path modelling in international marketing, *Advances in International Marketing*, 20, 277-320.
- Herzberg, F., Mausner, B. & Snyderman, B. (1959). *The Motivation to Work*, Wiley, New York.
- Herzberg, F.H, Mausner, B.M, Peterson, R.O. & Capwell, D. F. (1957). *Job Attitudes: Review of Research and Opinion*. Pittsburgh: Psychological Service of Pittsburgh.
- Heslin, P. A., Latham, G. P., & VandeWalle, D. (2005). The effect of implicit person theory on performance appraisals. *Journal of Applied Psychology*, 90(5), 842.
- Hom, W. (2000). An Overview of Customer Satisfaction Models. *RP Group Proceedings 2000*. Available at <http://rpgroup.org/publications/ConfProceedings-WorkshopPapers/38th-conf-may-2000/03-Hom-Customer-Satisfaction-Models.pdf>
- Howard, J. A., & Sheth, J. N. (1969). *The theory of buyer behavior* (Vol. 14). New York: Wiley.
- Howley, P. (2010). ‘Sustainability versus Liveability’: An exploration of central city housing satisfaction. *European Journal of Housing Policy*, 10(2), 173-189.
- Hronec, S.M. (1993). *Vital Signs, Using Quality, Time and Cost Performance Measurement to Chart you Company's Future*. New York: Amacom.
- Hsu, H. H., Chen, W. H. & Hsieh, M. J. (2006). Robustness testing of PLS, LISREL, EQS and ANN-based SEM for measuring customer satisfaction. *Total Quality Management and Business Excellence*, 17(3), 355–372.
- Hu, L. & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55.

- Huang, Z., & Du, X. (2015). Assessment and determinants of residential satisfaction with public housing in Hangzhou , China. *Habitat International*, 47, 218–230.
- Hunt, H. Keith. (1977). “CS/D–overview and future directions,” in Conceptualization and Measurement of Consumer Satisfaction and Dissatisfaction, H. Keith Hunt (Ed.). Cambridge, MA: Marketing Science Institute
- Hurlburt, R., & Schwitzgebel, E. (2007). *Describing Inner Experience? Proponent Meets Skeptic*. Massachusetts Institute of Technology, United Kingdom. The MIT Press.
- Husin, H. N., Nawawi, A. H., Ismail, F. & Khalil, N. (2011). Development of hierarchy for safety elements and its attributes for Malaysia’s low cost housing, *Procedia Engineering*, 20, 71–79. doi:10.1016/j.proeng.2011.11.140.
- Husin, H. N., Nawawi, A. H., Ismail, F. & Khalil, N. (2012a). Preliminary Survey of Integrated Safety Elements into Post Occupancy Evaluation for Malaysia’s Low Cost Housing. *Procedia - Social and Behavioral Sciences*, 36(June 2011), 583–590.
- Husin, H. N., Nawawi, A. H., Ismail, F., & Khalil, N. (2012b). Safety Performance Assessment Scheme for Low Cost Housing: A Comparative Study. *APCBEE Procedia*, 1(January), 351–355. doi:10.1016/j.apcbee.2012.03.058
- Husin, H. N., Nawawi, A. H., Ismail, F., & Khalil, N. (2014). Analysis on Occupants’ Satisfaction for Safety Performance Assessment in Low Cost Housing. In *E3S Web of Conferences* (Vol. 3, p. 01004). EDP Sciences.
- Husin, H. N., Nawawi, A. H., Ismail, F., & Khalil, N. (2015). Correlation Analysis of Occupants’ Satisfaction and Safety Performance Level in Low Cost Housing. *Procedia-Social and Behavioral Sciences*, 168, 238-248.
- Husna, S., & Nurizan, Y. (1987). Housing provision and satisfaction of low-income households in Kuala Lumpur. *Habitat International*, 11(4), 27 - 38.
- Hutchison, R. (Ed.). (2009). *Encyclopedia of urban studies*. Sage Publications.
- Hydes, K. P., McCarry, B., Mueller, T. & Hyde, R. (2004). Understanding our green buildings: Seven post-occupancy evaluations in British Columbia, in Proceedings of SBSE Conference Closing The Loop: Post Occupancy Evaluation: The Next Steps, Windsor, UK, Society of Building Science Educators, 29 April–2 May, CD-Rom
- Ibem, E. O. (2012). Residents' perception of the quality of public housing in urban areas in Ogun State, Nigeria. *International Journal of Quality & Reliability Management*, 29(9), 1000-1018.
- Ibem, E. O., & Amole, O. O. (2010). Evaluation of public housing programmes in Nigeria: A theoretical and conceptual approach. *The Built & Human Environment Review*, 3, 88-117.

- Ibem, E. O., & Amole, O. O. (2011). Assessment of the qualitative adequacy of newly constructed public housing in Ogun State, Nigeria, *Property Management*, 29 (3), 285–304. doi:10.1108/02637471111139437
- Ibem, E. O., Adeboye, A. B., & Alagbe, O. A. (2015). Similarities and differences in residents' perception of housing adequacy and residential satisfaction. *Journal of Building Performance*, 6(1), 1-14.
- Ibem, E. O., Opoko, A. P., Adeboye, A. B., & Amole, D. (2013). Performance evaluation of residential buildings in public housing estates in Ogun State, Nigeria: Users' satisfaction perspective, *Frontiers of Architectural Research*, 2 (2), 178–190. doi:10.1016/j.foar.2013.02.001.
- Ibem, E.O., Aduwo, E. B., & Uwakonye, O. (2012). Adequacy of Incremental Construction Strategy for Housing Low-Income Urban Residents in Ogun State, Nigeria, *Built Environment Project and Asset Management*, 2 (2), pp. 182 – 194.
- Ilesanmi, A.O. (2005). An evaluation of selected public housing schemes of Lagos State Development and Property Corporation, Lagos Nigeria, Obafemi Awolowo University (OAU), Ile-Ife. PhD Thesis.
- Israel A. A. & Bashiru R. A. (2008). Public and private developers as agents in urban housing delivery in sub-Saharan Africa: The situation in Lagos state. *Humanity & Social Sciences Journal*, 3(2), 143-150.
- Jaafar, M., Hasan, N . L., Mohamad, O. & Ramaya, T. (2005). The determinants of housing satisfaction level: A study on residential development project by Penang Development Corporation (PDC). *Jurnal Kemanusiaan*, 6.
- Jabareen, Y. R. (2006). Sustainable urban forms: their typologies, models and concepts, *Journal of Planning Education and Research*, 26(1), pp. 38–52.
- Jansen, S. J. T. (2014). The impact of the have e want discrepancy on residential satisfaction. *Journal of Environmental Psychology*, 40, 26–38.
- Jay, I., & Bowen, P. (2011). What residents' value in low-cost housing schemes : some South African concepts. *Building Research & Information*, 39(6), 574–588.
- Jiboye, A. D. (2009). Evaluating tenants' satisfaction with public housing in Lagos, Nigeria. *Town Planning and Architecture*, 33(4), 239-247.
- Jiboye, A. D. (2012). Post-occupancy evaluation of residential satisfaction in Lagos, Nigeria: Feedback for residential improvement. *Frontiers of Architectural Research*, 1(3), 236-243.
- Johnson, M. D., Anderson, E. W. & Fornell, C. (1995). Rational and adaptive performance expectations in a customer satisfaction framework. *Journal of consumer research*, 695-707.
- Jöreskog, K. G. (1999). How large can a standardized coefficient be? SSI Central Inc. Unpublished.

- Jöreskog, K., & Sörbom, D. (1981). *LISERL V: Analysis of Linear Structural Relationships by the Method of maximum Likelihood*, Chicago: National Education Resources.
- Kaatz, E., Root, D., & Bowen, P. (2005). Broadening project participation through a modified building sustainability assessment. *Building Research & Information*, 33(5), 441–454. doi:10.1080/09613210500219113
- Kaitilla, S. (1993). Satisfaction with public housing in Papua New Guinea: the case of West Taraka housing scheme. *Environment and Behavior*, 25 (4), 514–545.
- Kano, N., Seraku, N., Takahashi, F., & Tsuji, S. (1984). Attractive quality and must-be quality. *Journal of the Japanese Society for Quality Control*, 14(2), 147-156.
- Kasim, R., Ahmad, A. & Eni, S. (2006). Skills for engaging communities in the housing neighbourhood facilities process: *The European Experience, Property Management*, 29 (1), 87-102.
- Katz, D., & Kahn, R. (1978). *The social psychology of organizations* (2nd ed.). New York: Wiley.
- Khair, N., Ali, H. M., Sipan, I., Juhari, N. H., & Daud, S. Z. (2015). Post occupancy evaluation of physical environment in public low-cost housing. *Jurnal Teknologi*, 75(10). 155–162.
- Khair, N., Ali, H. M., Wilson, A. J., & Juhari, N. H. (2012). Physical environment for post occupancy evaluation in public low-cost housing. In *Proceedings of the Third International Conference on Business and Economic Research (ICBER)*. Available from: www.internationalconference.com. mvS.(accessed 12.11. 13).
- Khalil, N., & Nawawi, A. H. (2009). Performance analysis of government and public buildings via post occupancy evaluation. *Asian Social Science*, 4(9), 103.
- Kim, H.K., Han, S.H., Park, J., Park, W., Park, Y.S., Cho, Y., Chun, J. & Oh, S. (2009). The definition of user experience through a literature survey. In: *Proceedings of the 2009 Fall Conference of the Korean Institute of Industrial Engineers*.
- Kim, M. J., Oh, M. W. & Kim, J. T. (2013). A method for evaluating the performance of green buildings with a focus on user experience. *Energy and Buildings*, 66, 203-210.
- Kim, S. S., Yang, I. H., Yeo, M. S., & Kim, K. W. (2005). Development of a housing performance evaluation model for multi-family residential buildings in Korea. *Building and environment*, 40(8), 1103-1116.
- Kline, R. B. (1998). *Principles and Practice of Structure Equation Modelling*, (1st ed.), The Guildford Press, New York.

- Kondrasuk, J. N. (2011). So what would an ideal performance appraisal look like? *Journal of Applied Business and Economics*, 12(1), 57-71.
- Kowaltowski, D. C. C. K., Silva, V. G., Labaki, L. C., Silva, A., Piria, M. G., Ruschel, R. C. & Moreira, D. C. (2004). *From post-occupancy to design evaluation: site-planning guidelines for low income housing in the state of Sao Paulo, Brazil*. Brazilian Fund Agency for Technology and Scientific Development.
- Kripke, S. (1982). *Wittgenstein on Rules and Private Language*, Cambridge, MA: Harvard University Press.
- Kuhn, T.S. (1962). *The structure of scientific revolutions*. University of Chicago Press, Chicago.
- Kuniavsky, M. (2007). User experience and HCI. In: Sears, A., Jacko, J.A. (Eds.). *The human-computer interaction handbook: fundamentals, evolving technologies, and emerging applications*. Lawrence Erlbaum Associates Inc, New York.
- Kwon, S.-H., Chun, C., & Kwak, R.-Y. (2011). Relationship between quality of building maintenance management services for indoor environmental quality and occupant satisfaction. *Building and Environment*, 46(11), 2179–2185.
- Lall, S. (2002). An evaluation of a public sector low-income housing project in Alwar, India, Working Paper 6 at Society for Development Studies in New Delhi-India prepared for the DFID. Downloaded from http://practicalaction.org/docs/shelter/uhd_wp6_evaluation. Accessed on November 9, 2014.
- Langston, C., Song, Y., & Purdey, B. (2008). Perceived conditions of workers in different organizational settings. *Facilities*, 26(1/2), 54-67.
- LaTour, S. A., & Peat, N. C. (1979). Conceptual and methodological issues in consumer satisfaction research”, *Advances in consumer research*, 6 (1), 431-437.
- Lavy, S., Garcia, J. A., Scinto, P., & Dixit, M. K. (2014). Key performance indicators for facility performance assessment: simulation of core indicators. *Construction Management and Economics*, 32(12), 1183-1204.
- Law, E. L. C., & van Schaik, P. (2010). Modelling user experience—An agenda for research and practice. *Interacting with computers*, 22(5), 313-322.
- Law, E., Roto, V., Hassenzahl, M., Vermeeren, A., & Kort, J. (2009). Understanding, Scoping and Defining User experience: A Survey Approach. *Proc. CHI'09, ACM SIGCHI conference on Human Factors in Computing Systems*.
- Lawler, E. E., & Porter, L. W. (1967). The Effect of Performance on Job Satisfaction. *Industrial Relations: A Journal of Economy and Society*, 7(1), 20-28.

- Leaman, A., & Bordass, B. (1999). Productivity in buildings: the 'killer' variables. *Building Research & Information*, 27(1), 4-19.
- Leaman, A., & Bordass, B. (2001). Assessing building performance in use 4: the Probe occupant surveys and their implications. *Building Research & Information*, 29(2), 129-143.
- Leaman, A., Stevenson, F., & Bordass, B. (2010). Building evaluation: practice and principles. *Building Research & Information*, 38(5), 564–577.
- Lee, G. K., & Chan, E. H. (2010). Evaluation of the urban renewal projects in social dimensions. *Property Management*, 28(4), 257-269.
- Lim, C. K. & Sen, R. N. (2000). Ergonomic design improvements of low-cost houses in Malaysia. Proceedings of 2nd *CybErg International Conference*, 688 – 697.
- Lindell, M. K., & Whitney, D. J. (2001). Accounting for common method variance in cross-sectional research designs, *Journal of Applied Psychology*, 86 (1), 114-121.
- Little, T. D., Bovaird, J. A., & Widaman, K. F. (2006). On the merits of orthogonalizing powered and product terms: Implications for modeling interactions among latent variables. *Structural Equation Modeling*, 13(4), 497-519.
- Liu, A. M. (1999). Residential satisfaction in housing estates: a Hong Kong perspective. *Automation in Construction*, 8(4), 511–524. doi:10.1016/S0926-5805(98)00098-3
- Loftness, V., Aziz, A., Choi, J., Kampschroer, K., Powell, K., Atkinson, M., & Heerwagen, J. (2009). The value of post-occupancy evaluation for building occupants and facility managers. *Intelligent Buildings International*, 1(4), 249–268.
- Long, C. S., Kowang, T. O., Ismail, W. K. W., & Rasid, S. Z. A. (2013). A Review on Performance Appraisal System: An Ineffective and Destructive Practice? *Middle-East Journal of Scientific Research*, 14(7), 887-891.
- Lynch, S. (2003). Missing Data (Soc 504). *Princeton University Sociology*, 504.
- Lynn, P., Erens, B., & Sturgis, P. (2012). *A strategy for survey methods research in the UK*. London, England: ESRC Survey Resources Network.
- MacCallum, R. C., & Tucker, L. R. (1991). Representing Sources of Error in the Common-Factor Model - Implications for Theory and Practice. *Psychological Bulletin*, 109 (3), 502-511.
- Magutu, J., (1997). An appraisal of Chaani low-income housing programme in Kenya. *Environment and Urbanization* 9(2), 307-320.
- Marcano, L. & Ruprah, I. (2008). An impact evaluation of Chile's progressive housing programme, Working Paper: OVE/WP-06/08, Office of Evaluation and Oversight, Inter-American Development Bank,

Washington, DC, June, available at: www.iadb.org/ove/defaultNoCache.aspx?Action (accessed 22 June 2009).

- March, J. G. & Simon, H. A (1958) *Organizations*. New York: Wiley
- Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First- and higher order factor models and their invariance across groups, *Psychological Bulletin*, 97 (3), 562-582.
- Martella, R. C., Nelson, R., & Martella-Marchand, N. E. (1999). *Research methods: Learning to become a critical research consumer*. Boston: Allyn and Bacon.
- Martin, C. S., & Guerin, D. A. (2006). Using research to inform design solutions. *Journal of Facilities Management*, 4(3), 167–180. doi:10.1108/14725960610673751
- Martin, J. (1992). *Cultures in organizations: Three perspectives*. New York: Oxford University Press.
- McDonald, R.P. (1985). Factor analysis and related methods. Hillside, NJ: Lawrence Erlbaum Associates, Inc.
- Meir, I. A., Garb, Y., Jiao, D., & Cicelsky, A. (2009). Post-occupancy evaluation: an inevitable step toward sustainability. *Advances in building energy research*, 3(1), 189-219.
- Melone, N. P. (1990). A theoretical assessment of the user-satisfaction construct in information systems research. *Management science*, 36(1), 76-91.
- Menzies, G. F. & Wherrette, J. R. (2005). Windows in the workplace: Examining issues of environmental sustainability and occupant comfort in the selection of multi-glazed windows, *Energy and Buildings*, 37(11), 623–630.
- Merton, R. (1957). *Social theory and social structure* (Rev. ed.). Glencoe, IL: The Free Press.
- Micceri, T. (1989). The unicorn, the normal curve, and other improbable creatures. *Psychological bulletin*, 105(1), 156.
- Mlecnik, E., Schütze, T., Jansen, S. J. T., De Vries, G., Visscher, H. J., & Van Hal, a. (2012). End-user experiences in nearly zero-energy houses. *Energy and Buildings*, 49, 471–478. doi:10.1016/j.enbuild.2012.02.045
- Mohit, M. A., & Azim, M. (2012). Assessment of Residential Satisfaction with Public Housing in Hulhumale', Maldives. *Procedia - Social and Behavioral Sciences*, 50(July), 756–770. doi:10.1016/j.sbspro.2012.08.078
- Mohit, M.A, Ibrahim, M. & Rashid, Y.R. (2010). Assessment of residential satisfaction in newly designed public low-cost housing in Kuala Lumpur, Malaysia. *Habitat International*, 34, 18–27.

- Monfared, I. G. & Sharples, S. (2011). Occupants' perceptions and expectations of a green office building: a longitudinal case study, *Architectural Science Review*, 54 (4), 344-355.
- Muijs, D. (2004). *Doing quantitative research in education with SPSS (1st ed)*. London: Sage.
- Myers, J. H., & Warner, W. G. (1968). Semantic properties of selected evaluation adjectives. *Journal of Marketing Research*, 409-412.
- Nandy, K. (2012). Understanding and quantifying effect sizes. California: University of California Los Angeles (UCLA). Retrieved from <http://nursing.ucla.edu/workfiles/research/Effect%20Size%204-9-2012.pdf>.
- Naumann, A., & Wechsung, I. (2008). Developing usability methods for multimodal systems: The use of subjective and objective measures. In *Proceedings of the International Workshop on Meaningful Measures: Valid Useful User Experience Measurement (VUUM)* (pp. 8-12).
- Nawawi, A. H., & Khalil, N. (2008). Post-occupancy evaluation correlated with building occupants' satisfaction: An approach to performance evaluation of government and public buildings. *Journal of Building Appraisal*, 4(2), 59-69.
- Newman, I., & Benz, C. R. (1998). *Qualitative-quantitative research methodology: Exploring the interactive continuum*. Carbondale, Illinois: Southern Illinois University Press.
- Niroumand, H., Zain, M. F. M., & Jamil, M. (2013). Building Evaluation based on Sustainable Development using Questionnaire System. *Procedia - Social and Behavioral Sciences*, 89(2008), 454-460.
- Nordberg, M. (2008, August). Thermal comfort and indoor air quality when building low-energy houses. In *Proceedings of Indoor Air 2008 Conference, Copenhagen, Denmark* (pp. 17-22).
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory*, (3rd ed.), McGraw-Hill, New York.
- Obeng-Odoom, F. (2009). Has the Habitat for Humanity Housing Scheme achieved its goal? A Ghanaian case study. *Journal Housing and the Built Environment*, 24, 67-84.
- Offia Ibem, E. (2011). Challenges of disaster vulnerability reduction in Lagos Megacity Area, Nigeria. *Disaster Prevention and Management: An International Journal*, 20(1), 27-40.
- Oladapo A.A (2005). An evaluation of the maintenance management of the staff housing estates of selected first generation universities in south western Nigeria. Obafemi Awolowo University, Nigeria. PhD Thesis.
- Oladapo, A.A. (2006). A Study of Tenants' Maintenance Awareness, Responsibility and Satisfaction in Institutional Housing in Nigeria,

International Journal of Strategic Property Management, 10 (4), pp. 217-231.

- Oliver, A. (1996). The Metaphysics of Properties, *Mind* 105(417): 1-80.
- Oliver, R. L. (1976). Hedonic reactions to the disconfirmation of product performance expectations: Some moderating conditions. *Journal of Applied Psychology*, 61(2), 246.
- Oliver, R. L. (1997), Satisfaction: A Behavioural Perspective on the Consumer, New York: McGraw Hill.
- Oliver, R. L., & DeSarbo, W. S. (1988). Response determinants in satisfaction judgments, *Journal of consumer research*, 495-507.
- Oliver, R. L., & Swan, J. E. (1989). Equity and disconfirmation perceptions as influences on merchant and product satisfaction, *Journal of consumer research*, 372-383.
- Oliver, R. L. (1981). Measurement and Evaluation of Satisfaction Processes in Retail Settings. *Journal of Retailing* 57(3), 25-48.
- Olson, J. C., & Dover, P. A. (1979). Disconfirmation of consumer expectations through product trial. *Journal of Applied psychology*, 64(2), 179.
- Omari, S., & Woodcock, A. (2012). Post Occupancy Evaluation of Primary Schools in Saudi Arabia, *Work* (41), 881-887.
- Organ, D. W. (1977). A reappraisal and reinterpretation of the satisfaction-causes-performance hypothesis. *Academy of management review*, 2(1), 46-53.
- Osso, A., Gottfried, D. A., Walsh, T., & Simon, L. N. (1996). Sustainable building technical manual. *Public Technology Inc., New York*.
- Ozturk, Z., Arayici, Y., & Coates, P. (2008). Post Occupancy Evaluation (POE) in Residential Buildings Utilizing BIM and Sensing Devices : Salford Energy House Example.
- Ozturk, Z., Arayici, Y., & Coates, S. (2012). Post occupancy evaluation (POE) in residential buildings utilizing BIM and sensing devices: Salford energy house example, in *Retrofit 2012*. Salford Quays, Greater Manchester. Retrieved from <http://usir.salford.ac.uk/id/eprint/20697>.
- Pallant, J. (2011). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS for Program*. (4th ed.). Australia, Allen & Unwin.
- Park, J., Han, S. H., Kim, H. K., Oh, S., & Moon, H. (2013). Modeling user experience: A case study on a mobile device. *International Journal of Industrial Ergonomics*, 43(2), 187-196.
- Parsons, T. (1951). *The social system*. New York: The Free Press.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Thousand Oaks, CA, US: Sage Publications, Inc.

- Paul, W. L., & Taylor, P. A. (2008). A comparison of occupant comfort and satisfaction between a green building and a conventional building. *Building and Environment*, 43(11), 1858-1870.
- Paulsen, M. B., & Smart, J. C. (Eds.). (2013). *Higher education: Handbook of theory and research*. Dordrecht: Springer.
- Pedersen, L.H (2008). Is realistic evaluation a realistic approach for complex reforms? *Evaluation* 14 (3), 271-293.
- Pemsel, S., Widen, K. & Hansson, B. (2010). Managing the needs of end-users in the design and delivery of construction projects, *Facilities*, 28 (112), 17-30.
- Pfeffer, J. (1993). *New directions for organization theory: Problems and prospects*. New York: Oxford University Press.
- Pine, B. J. & Gilmore, J. H. (1999). *The experience economy: work is theatre & every business a stage*. Harvard Business Press.
- Pitts, A. E. & Douvrou-Beggiora, E. (2004). Post-Occupancy Analysis of Comfort in Glazed Atrium Spaces, in *Proceedings of SBSE Conference Closing The Loop: Post Occupancy Evaluation: The Next Steps*, Windsor, UK, Society of Building Science Educators, 29 April–2 May, CD-Rom.
- Porter, L. W. & Lawler, E. E. (1968). *Managerial Attitudes and Performance*. Homewood, Ill.:Irwin
- Preiser, W. (2001). Feedback, feed forward and control: post occupancy evaluation to the rescue, *Building Research and Information*, 29 (6) 456-9.
- Preiser, W. F. E. & Vischer, J. C. (2005). *Assessing Building Performance*. Butterworth Heinemann, Elsevier.
- Preiser, W., & Vischer, J. (Eds.). (2006). *Assessing building performance*. Routledge.
- Prieser, W.F.E., Rabinowitz, Z. & White,T. (1988). *Post Occupancy Evaluation*. New York: Van Nostrand Reinhold.
- Puntel, L. B. (2008). *Structure and Being: A Theoretical Framework for a Systematic Philosophy*. White, A. (Trans.), University Park • Pennsylvania: The Pennsylvania State University Press.
- Puntel, L. B. (2010). *Structure and being: a theoretical framework for a systematic philosophy*. USA: Pennsylvania State Press.
- Rainer, R. K., & Harrison, A. W. (1993). Toward Development of the End User Computing Construct in a University Setting, *Decision Sciences*, 24 (6), 1187-1202.
- Ramdane, D., & Abdullah, A.-A. (2000). Satisfaction level with neighbourhoods in low-income public housing in Yemen. *Property Management*, 18(4), 230.

- Rebaño-Edwards, S. (2007). Modelling perceptions of building quality—A neural network approach. *Building and Environment*, 42(7), 2762–2777. doi:10.1016/j.buildenv.2006.07.018
- Rees, K. (2009). Performance Management Report on Housing Strategy Action Plan 2008/09: Report of Head of Housing Services. U.K: South Oxon.
- Rent, G. S., & Rent, C. S. (1978). Factors related to residential satisfaction. *Environment and Behaviour*, 10, 459–488.
- Riley, M., Kokkarinen, N., & Pitt, M. (2010). Assessing post occupancy evaluation in higher education facilities. *Journal of Facilities Management*, 8(3), 202–213. doi:10.1108/14725961011058839
- Ruiz, M. C., & Fernández, I. (2009). Environmental assessment in construction using a Spatial Decision Support System. *Automation in Construction*, 18(8), 1135-1143.
- Rummel, R.J. (1970). *Applied factor analysis*. Evanston, IL: Northwestern University Press.
- Salleh, N.I., Yusof, N.B, Salleh, A.C., & Johari, N.D. (2011). Tenant Satisfaction in Public Housing and its Relationship with Rent Arrears: Majlis Bandaraya Ipoh, Perak, Malaysia, *International Journal of Trade, Economics and Finance*, 2 (1), 10-23.
- Santos, J. (2002). From intangibility to tangibility on service quality perceptions: a comparison study between consumers and service providers in four service industries, *Managing Service Quality: An International Journal*, 12 (5), 292 – 302.
- Scherer, A., & Steinmann, H. (1999). Some remarks on the problem of incommensurability in organization studies. *Organization Studies*, 20(3), 519–544.
- Schonemann, P. H. (1990). Facts, Fictions, and Common-Sense about Factors and Components. *Multivariate Behavioral Research*, 25 (1), 47-51.
- Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of educational research*, 99(6), 323-338.
- Schultz, M., & Hatch, M. (1996). Living with multiple paradigms: The case of paradigm interplay in organizational culture studies. *Academy of Management Review*, 21(2), 529–557.
- Schwab, D. P., & Cummings, L. L. (1970). Theories of performance and satisfaction: A review. *Industrial Relations*, (9), 408-430.
- Sekaran, U. (2000). *Research Methods for Business: A Skill -Building Approach* (3rd ed.). New York: John Wiley & Sons, Inc.

- Sengupta, U., & Tipple, A. G. (2007). The Performance of Public-sector Housing in Kolkata, India, in the Post-reform Milieu, *Urban Studies*, 44 (10), 2009–2027.
- Seshadhri, G., & Topkar, V. (2014). Validation of a Questionnaire for Objective Evaluation of Performance of Built Facilities. *Journal of Performance of Constructed Facilities*, 30(1), 04014191.
- Shammout, A. B. (2007). *Evaluating an extended relationship marketing model for Arab guests of five-star hotels*. Victoria University: Ph.D. Thesis.
- Shen, W., Shen, Q., & Sun, Q. (2012). Building Information Modeling-based user activity simulation and evaluation method for improving designer–user communications. *Automation in Construction*, 21, 148–160. doi:10.1016/j.autcon.2011.05.022
- Sheppard, L. (2011). Construction Management and Economics Improving Healthcare through Built Environment Infrastructure Book Reviews, (December 2012).
- Simeone, D., & Fioravanti, A. (2012). An ontology-based system to support agent-based simulation of building use. *Journal of Information Technology in Construction*, 17, 258-270.
- Sinou, M., & Kyvelou, S. (2006). Present and future of building performance assessment tools. *Management of Environmental Quality: An International Journal*, 17(5), 570-586.
- Sirgy, M. J. (1984). A social cognition model of consumer satisfaction/dissatisfaction: An experiment . *Psychology and Marketing*, 1, 24–77.
- Southworth, M., Cranz, G., Lindsay, G. & Morhayim, L. (2012). People in the design of urban places, *Journal of Urban Design*, 17 (4), 461-465.
- Stame, N. (2004). Theory-based evaluation and types of complexity. *Evaluation*, 10(1), 58-76
- Steiger, J. H. (1990). Some additional thoughts on components, factors, and factor-indeterminacy. *Multivariate Behavioral Research*, 25 (1), 41-45.
- Stevenson, F. & Leaman, A. (2010). Evaluating Housing Performance in Relation to Human Behaviour: New Challenges, *Building Research & Information*, 38 (5), 437-441.
- Stevenson, F. (2004). Post-occupancy squaring the circle: a case study on innovative social housing in Aberdeenshire, Scotland. In: ‘Closing the Loop’ Post Occupancy Evaluation Conference, Windsor, 29 April–2 May 2004.
- Sudin, S. (2011). Fairness of and satisfaction with performance appraisal process. *Journal of Global Management*, 2(1), 66-83.

- Suhr, D. D. (2005). Principal Component Analysis vs. Exploratory Factor Analysis, *SUGI 30 Proceedings*, SAS Institute Inc. Philadelphia, Pennsylvania April 10-13, 2005, Paper 203-30
- Swan, J. E., & Combs, L. J. (1976). Product performance and consumer satisfaction: A new concept. *The Journal of Marketing*, 25-33.
- Tabachnick, B. G., & S.Fidell, L. (2001). *Using Multivariate Statistics*, (4th ed.), Allyn & Bacon, Needham Heights, USA.
- Tabachnick, B.G. & Fidell, L.S. (2013). *Using multivariate statistics*. (6th ed). New Jersey. Pearson Education, Inc.
- Talbot, C. (2010). *Theories of performance*, New York: Oxford University Press
- Taylor-Powell, E. (2009). *Wording for rating scales*. UK: Board of Regents, University of Wisconsin System.
- Technical Assistance Research Program (1981). Measuring the grapevine-consumer response and word of mouth, Atlanta, GA: The Coca Cola Company.
- Tesser, A., & Rosen, S. (1975). The reluctance to transmit bad news. *Advances in experimental social psychology*, 8, 193-232.
- Thorndike, E. L. (1898). Animal intelligence: An experimental study of the associative processes in animals. *Psychological Monographs: General and Applied*, 2(4), i-109.
- Tomal, D. R. (2010). *Action research for educators*. Plymouth, UK: Rowman & Littlefield Publishers.
- Triandis, H. C. (1959). A critique and experimental design for the study of the relationship between productivity and job satisfaction. *Psychological Bulletin*, 56(4), 309.
- Tse, D. K., & Wilton, P. C. (1988). Models of consumer satisfaction formation: An extension. *Journal of marketing research*, 25, 204-212.
- Turpin-Brooks, S., & Viccars, G. (2006). The development of robust methods of post occupancy evaluation. *Facilities*, 24(5/6), 177-196. doi:10.1108/02632770610665775
- Ukoha, O. M., & Beamish, J. O. (1997). Assessment of residents' satisfaction with public housing in Abuja, Nigeria. *Habitat international*, 21(4), 445-460.
- Vandenberg, R. J. & Scarpello, V. (1994). A longitudinal assessment of the determinant relationship between employee commitments to the occupation and the organization, *Journal of Organizational Behavior*, 15 (6), 535-547.
- Varady, D.P. & Carrozza, M.A. (2000). Toward a better way to measure customer satisfaction levels in public housing: A Report from Cincinnati, *Housing Studies*, 15 (6), 797-825

- Vavra, T.G. (1997), *Improving your Measurement of Customer Satisfaction*, Milwaukee, WI: ASQ Quality Press.
- Voelker, C., Beckmann, J., Koehlmann, S., & Kornadt, O. (2013). Occupant requirements in residential buildings: an empirical study and a theoretical model. *Advances in Building Energy Research*, 7(1), 35-50.
- Vroom, V. H. (1964). *Work and Motivation*, New York: Wiley
- Wagner, A., Gossauer, E., Moosmann, C., Gropp, T.H., & Leonhart, R. (2007). Thermal comfort and workplace occupant satisfaction - Results of field studies in German low energy office buildings. *Energy and Buildings*, 39, 758–769.
- Wang, S. T., Ho, D. C. W., & Chen, W. (2005). An introduction to the health concern in the Dwelling Performance Rating System in Mainland China. In *Proceeding of CII-HK Conference*, 95-108.
- Wang, Y.W. (2003). Residential development in China, in Proceedings of the Third China Urban Housing Conference, 3-5 July, Hong Kong, 23-35.
- Wang, Z. & Lim, B. T. H. (2012). Managing changes in construction: a conceptual framework. 6th International Conference and Workshop on the Built Environment in Developing Countries, 4-5 December 2012, Adelaide, Australia.
- Watson, C.G. (1999). *Evolving Design for Changing Values and Ways of Life*, IAPS14 International Association for People-Environment Studies, Stockholm, New Zealand.
- Way, M., & Bordass, B. (2005). Making feedback and post-occupancy evaluation routine 2: Soft landings – involving design and building teams in improving performance. *Building Research & Information*, 33(4), 353–360. doi:10.1080/09613210500162008
- Weidemann, S., & Anderson, J. R. A. (1985). A conceptual framework for residential satisfaction. In I. Atman, & R. Werner (Eds.), *Home environments* (154–182). London: Plenum Press.
- Westbrook, R. A. (1980). A rating scale for measuring product/service satisfaction. *The Journal of Marketing*, 68-72.
- Westbrook, R. A., & Oliver, R. L. (1981). Developing better measures of consumer satisfaction: some preliminary results. *Advances in consumer research*, 8(1), 94-99.
- Westbrook, R. A., & Reilly, M. D. (1983). Value-percept disparity: An alternative to the disconfirmation of expectations theory of consumer satisfaction. *Advances in consumer research*, 10(1), 256-261.
- Wheaton, B., Muthen, B., Alwin, D. F. & Summer, G. F. (1977). Assessing reliability and stability in panel models, in Heise, D. R. (Ed.), *Sociological Methodology* (pp. 84-136). San Francisco: Jossey-Bass.

- Wheeler, A., Boughlameg, D., & Malekzadeh, M. (2011). Developing a child-friendly post-occupancy assessment methodology for sustainable schools”, in *Third International Conference on Applied Energy* (pp. 1–19). Perugia, Italy. Retrieved from <https://dspace.lboro.ac.uk/dspace-jspui/handle/2134/8909>.
- Williams, B., Brown, T., & Onsmann, A. (2012). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine*, 8(3), 1.
- Winch, P. (1958). *The Idea of a Social Science*, London: Routledge and Kegan Paul.
- Woodruff, R. B., Cadotte, E. R., & Jenkins, R. L. (1983). Modeling consumer satisfaction processes using experience-based norms. *Journal of Marketing Research*, 20, 296–304.
- Woollett, S. & Ford, A. (2004). How happy are we? Our Experience of conducting an occupancy survey, in *Proceedings of SBSE Conference Closing the Loop: Post Occupancy Evaluation: The Next Steps*, Windsor, UK, Society of Building Science Educators, 29 April–2 May, CD-Rom.
- Worthing, D. (1994). Strategic property management, in Spedding, A. (Ed.), *CIOB Handbook of Facilities Management*, Longman, Harlow.
- Xiong, Y. (2007). The impact of exterior environmental comfort on residential behaviour from the insight of building energy conservation: A case study on Lower Ngau Tau Kok estate in Hong Kong. In *Building low energy cooling and advanced ventilation in the 21st century*, Proceedings of the 2nd PALENC and 28th AIVC Conference, Crete, 27-29, September, 2, 1141–1145.
- Yau, Y. (2006). *The Safety Performance of Apartment Buildings: Empirical Evidence from Hong Kong*. The University of Hong Kong, PhD Thesis.
- Yin, R. K. (2003). *Case Study Research: Design and Methods*, (3rd. Ed.), London. Sage Publications Ltd.
- Yong, A.G & Pearce, S. (2013). A beginner’s guide to factor analysis: focusing on exploratory factor analysis, *Tutorials in Quantitative Methods for Psychology* 9(2), 79-94.
- Yusof, N., Abdullah, S., Zubedy, S., & Najib, N.U.M. (2012). Residents’ maintenance priorities preference: the case of public, housing in Malaysia, *Procedia - Social and Behavioural Sciences*, (62), 508 – 513.
- Zadkarim, S. & Emari, H. (2011). Determinants of Satisfaction in Apartment Industry: Offering a Model. *Journal of Civil Engineering and Urbanism*, 1(1), 15-24.
- Zainal, N. R., Kaur, G., Ahmad, N. A., & Khalili, J. M. (2012). Housing conditions and quality of life of the urban poor in Malaysia. *Procedia-Social and Behavioral Sciences*, 50, 827-838. doi:10.1016/j.sbspro.2012.08.085

Zikmund, W. G., Babin, B. J., Carr, J. C. & Griffin, M. (2010). *Business Research Methods* (8th ed.). United States of America: South-Western, Cengage Learning.